



RESEARCH REPORT

Understanding the Landscape of Professional Learning for School Principals

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Executive Summary

Extensive research shows that a school's principal shapes the experiences and outcomes of both students and teachers. Principals play a key role in a school's success, so ensuring that they have opportunities to learn and hone skills to effectively lead their schools over their time in the role should be a priority for states and school districts.

This report focuses on those opportunities to build knowledge and skills during a principal's career. We refer to these opportunities as *in-service professional learning*, or simply *professional learning* (which we distinguish from *professional development*, or PD, a term that often refers to a set of one-size-fits-all sessions or events, such as workshops or webinars). Learning may occur through engagement with PD offered to leaders, or it may not. And, as we explore in great depth, leaders' learning frequently occurs well beyond the bounds of PD.

Building on a recent synthesis commissioned by the Wallace Foundation by Darling-Hammond and colleagues (2022) titled *Developing Effective Principals: What Kind of Learning Matters?*, this report delves into principal professional learning from the perspectives of principals themselves. We draw primarily on interview data from 63 principals working in diverse settings in Connecticut, Tennessee, and Washington, as well as a nationally representative survey of public-school principals. After analyzing principal interview and survey data, we also interviewed district-level leaders to gain their insights on our main results and their implications.

We focus on principals' professional learning related to the four domains of leadership that, according to decades of research, tend to matter most to student success: engaging with teachers around instruction, building a productive school climate, facilitating teacher collaboration, and strategic management (Grissom, Egalite, & Lindsay, 2021). We also cover a fifth dimension, leading for equity, which research connects to more robust educational opportunities for historically marginalized groups.

Our study is guided by three research questions. First, we asked what forms, modes, or structures principals' professional learning opportunities take. Second, we asked what content those learning opportunities covered. And third, we asked what kinds of learning—meaning, which ways of covering different leadership content—principals found to be most useful to their practice.

As we answered each of these questions, we also considered how differences might arise by principals' characteristics and characteristics of their schools.

Key Findings

Principals engaged in a range of formal learning opportunities, yet informal learning was more frequent and often perceived as more useful to improving practice.

Formal learning opportunities typically are sponsored or directed by the school district or another organization, often with deliberate structure and facilitation. Informal opportunities, by contrast, tend toward less structure and organization and often are pursued or directed by principals themselves. Principals in our study reported that they engaged in numerous types of formal learning, including workshops, organized networks, formal mentorships, and coaching by their supervisors. However, they reported that they engaged even more frequently in various kinds of informal learning opportunities, such as listening to podcasts, text groups with colleagues, and asking for advice from individuals with expertise in their schools. Further, they tended to describe these informal learning opportunities as more relevant and responsive to their immediate learning needs. Importantly, formal opportunities often set up informal opportunities to learn, including building connections, giving ideas for independent learning, and creating space for valued learning interactions with colleagues and supervisors.

Principals reported that their professional learning most often focused on instructional leadership. Learning about other important topics was less frequent.

Among the domains of practice that we asked principals about, engagement with instruction was the most frequent focus for principals' professional learning, whether formal or informal. Principals appreciated this emphasis, rating their learning about instructional engagement as the most useful to their work. Learning in the other high-leverage domains (building a productive school climate, facilitating teacher collaboration, and strategic management) was less frequent and often informal. Furthermore, the frequency of professional learning related to leading for equity was dependent on context. Principals wanted more learning support in numerous areas, though they identified time limitations and the many demands of the role as barriers to increased learning opportunities.

Principals' professional learning opportunities varied across districts and by key characteristics of principals and their schools, including principal experience level and school locale type.

Although most principals in our study were satisfied with their opportunities to learn, our data revealed substantial differences in those opportunities from district to district. District organizational structures, resources, and prioritization of principal learning appeared to drive some differences. On our survey, rural principals reported less access to formal learning opportunities than their urban colleagues, though these differences were small. Early-career principals tended to report more

opportunities, especially coaching and mentoring. Black principals reported more of all modes of learning, a result not completely driven by the kinds of schools or districts in which Black principals tend to work.

Implications

We identify several important implications of our findings for school districts, states, and principals.

For school districts, our results suggest a need to build coherent systems to guide principal professional learning. District leaders can ensure that principals' learning is high-quality and relevant to their needs while also reflecting district priorities, engaging multiple modes of learning, and including content that spans the domains of principal practice. In particular, we suggest that district leaders:

- **Increase the relevance of formal learning opportunities.** Districts should strive to make the formal learning opportunities that they sponsor or facilitate as relevant as possible to principals' week-to-week work.
- **Support leaders in finding quality learning opportunities that match their needs.** Districts can create systems to help individual principals recognize their learning needs and connect them to high-quality learning resources that address those needs.
- **Lean into informal learning.** Recognizing the ubiquity of informal learning, districts can facilitate that learning intentionally by, for example, organizing principals into professional support groups or creating space for informal discussion in the context of formal learning sessions.
- **Remove barriers to learning.** Districts should aim to reduce barriers, such as insufficient time, to principals' engagement in professional learning. Smaller or more rural districts often experience additional barriers, such as challenges with setting up mentoring or networks, which may need creative solutions such as regional collaboratives or engagement with technology platforms.
- **Attend to leadership for equity.** Bringing greater emphasis to leading for equity may be necessary in many districts, where a focus on leadership that ensures high-quality learning opportunities for students from historically marginalized groups has become more challenging or fallen off the learning agenda.

State-level leaders are well-positioned to support principals and district leaders with resources and structures to support principal learning. They can also provide leadership in building toward more coherent professional learning systems for principals in their states. We suggest the following actions for state-level leaders:

- **Provide resources for learning.** States can be a source of important financial resources for school districts seeking to create principal learning opportunities.
- **Collect and share high-quality learning resources.** States can play a role in identifying and making available rich learning resources for districts and

principals, perhaps in partnership with state principal professional associations.

- **Facilitate principals' access to networks for learning.** States can support districts, especially rural districts, in building networks for principals as hubs for learning.
- **Limit state-mandated demands on principals' time.** Legislatures and state education agencies have opportunities to reduce time demands on principals by streamlining requirements, including requirements for ineffective trainings, that may crowd out time for beneficial learning opportunities.

Our findings also suggest the following recommendations for principals considering their own professional learning:

- **Assess their learning needs and seek—and advocate for—formal and informal learning opportunities that address those needs.** Principals should constantly reassess their own learning needs and advocate for opportunities within or outside their districts that help them meet those needs.
- **Protect regular time for learning and reflection within the workday.** To the extent feasible, principals should intentionally create and protect time for their own learning, including informal learning. Making time for learning may mean working with supervisors or other district leaders on prioritizing professional learning time.

Introduction

Decades of research have established the importance of school principals for the success of public schools. As Grissom, Egalite, and Lindsay summarize in their 2021 synthesis of twenty years of research on the topic, the effectiveness of a school's principal helps determine all manner of outcomes for both students and teachers, including student achievement, attendance, and discipline, as well as teacher job satisfaction, working conditions, and retention. Principals also play a key role in driving their schools toward more equitable outcomes for students from marginalized and nonmarginalized backgrounds.

The importance of principals' work is perhaps surpassed only by its complexity. A principal's responsibilities span managing the school's instructional program, supporting teachers, implementing teacher evaluation policies, overseeing facilities, ensuring compliance with special education requirements, allocating the school budget, building culture among teachers and students, hiring staff, coordinating school schedules, handling student discipline, responding to parental concerns, and liaising with the community, among others. Together with their school leadership teams, principals need an array of knowledge and skills to meet these demands. Equipping them with that knowledge and those skills should be an essential goal for states and school districts.

High-quality pre-service preparation is an important component of meeting this goal. Yet the complexity of the work and the varied challenges from school to school and over time (e.g., responding to crises like COVID, grappling with artificial intelligence) mean that even the best pre-service programs are unlikely to fully prepare principals to meet all the demands of the role. To become and remain effective over time, principals need ongoing professional support and learning opportunities.

This report focuses on those opportunities to build knowledge and skills during a principal's career. We refer to these opportunities as *in-service professional learning*, or simply *professional learning* (which we distinguish from *professional development*, or *PD*, a term that often refers to a set of one-size-fits-all sessions or events, such as workshops or webinars). Learning may occur through engagement with PD offered to leaders, or it may not. And, as we explore in great depth, leaders' learning frequently occurs well beyond the bounds of PD.

Creating more robust approaches to principal professional learning requires first understanding its current landscape. Unfortunately, while research on *teacher* professional learning is voluminous enough to warrant numerous review articles (e.g., Darling-Hammond et al., 2017; Opfer & Pedder, 2011), the evidence on *principals'* learning is not as well developed. This report aims to extend this evidence and, in so doing, spark attention to principal learning in policy and practice and identify new directions for research.

Building on Existing Research

Our examination of principal professional learning builds on a recent synthesis commissioned by The Wallace Foundation and written by Darling-Hammond and colleagues (2022) titled *Developing Effective Principals: What Kind of Learning Matters?* That report undertook a comprehensive review of the research conducted over two decades on principal pre-service and in-service development efforts and their outcomes, which it coupled with analysis of data from multiple state and national surveys on principals' learning opportunities.

The 2022 report's assessment of in-service learning focused primarily on principals' formal PD programs, rather than taking a broad look at the full landscape of professional learning. Still, it drew several conclusions that provide a foundation for our analysis. It found that high-quality PD often produces positive effects on principals' leadership practices and student learning. Such PD, the report found, combines essential leadership content with individualized support (e.g., through coaching and mentoring), job-embedded learning activities, and peer collaboration. Access to these kinds of learning opportunities, however, are available unevenly to principals.

The report also underscored the need for more research on principals' in-service learning. Specifically, the authors highlighted that existing research focuses on the kinds of learning opportunities principals have but underemphasizes the content those opportunities address. We have little sense of *how* principals learn *what*.

It is into this gap that our study steps. We explore not just the modes of principal learning but how those modes engage different leadership content. Specifically, we focus our inquiry on content in the areas of leadership practice Grissom, Egalite, and Lindsay's (2021) evidence review linked most closely to student achievement: engaging with teachers around instruction, building a productive school climate, facilitating teacher collaboration, and managing strategically. We also investigate how principals learn about ways to ensure that their schools treat all students fairly, providing them with equitable opportunities to succeed. Attention to leadership for more equitable student opportunities for all learners has grown in recent decades (Darling-Hammond et al., 2022; Grissom, Egalite, & Lindsay, 2021).

In seeking to understand the design of professional learning that focuses on this essential content, we take a more expansive view than most prior studies. Through interviews with and surveys of principals, we consider opportunities from traditional "one-and-done" workshops to the opportunities for coaching, mentoring, and peer collaboration that Darling-Hammond and her coauthors highlighted. Yet we also take seriously research that suggests effective learning opportunities for adult professionals, including principals, are often self-directed and centered on current problems of practice (Zepeda et al., 2014), which leads us to explore less formal, more principal-driven modes of learning as well.

Our study is guided by three research questions. First, we asked what forms, modes, or structures principals' professional learning opportunities take. Second, we asked what content those learning opportunities covered. And third, we asked what kinds of learning—meaning, which ways of covering different leadership content—principals found to be most useful to their practice. As we answered each of these questions, we also considered how differences might arise by characteristics of the principals and their school contexts.

Data

We rely on two main data sources. First, we conducted roughly hourlong interviews with 63 principals in diverse school contexts in Connecticut, Tennessee, and Washington, the states where the authors work and have extensive professional networks to assist in principal recruitment. The interviews asked principals to describe and reflect on their professional learning opportunities across five focal content areas.

Second, we partnered with RAND to collect data from a nationally representative sample of public-school principals to explore the extent to which patterns we uncovered in the interviews generalized across the United States. RAND fielded the survey to its American School Leader Panel in January and February, 2025. The panel consists of more than 8,000 principals, approximately 3,100 of whom were sent the survey. RAND obtained complete responses from 998 principals and partial responses from an additional 100. (To learn more about the panels, visit www.rand.org/panels.)

In addition, after analyzing the principal interview and survey data, we interviewed district leaders in the three states to discuss our main findings. These interviews offered an opportunity to understand the context of principal professional learning from a district perspective and gain insight into the practical implications of our results.

Detailed information about interview and survey samples, protocol development, data collection, and analysis can be found in Appendix A.

Overview of the Report

The next three sections of the report correspond to our main research questions. Within each section, the text is organized by the main findings, which are denoted by subheadings.

First, we explore the modes that professional learning opportunities take. We document the range of formal professional learning opportunities principals accessed and show that agency over those opportunities can lie with the district or with principals themselves. We highlight that informal learning is a major

component of principal learning. We also observe that learning opportunities can have both formal and informal dimensions.

Second, we address the content covered by professional learning opportunities. We find that leading instruction was the dominant focus of both formal and informal professional learning. Learning in other domains is less common, and those opportunities are often informal and sought out by principals themselves. We also find that learning about leadership for equity, either as a standalone topic or embedded in coverage of the other content areas, is less frequent and that opportunities to learn in this area vary by state and district context.

Third, we investigate the combinations of professional learning mode and content that leaders perceive as most useful to their practice. Principals are generally satisfied with their opportunities to learn, and they find opportunities in the instructional domain most helpful to their practice. They also prefer informal to formal learning and especially value learning interactions with colleagues, supervisors, and coaches. We also discuss challenges to their learning that principals identified and areas in which they say they need additional support.

The concluding section summarizes and discusses the implications of our results. We also discuss limitations of our approach and outline future directions for research on principals' professional learning.

Modes of Principal Professional Learning

We begin by exploring the structures or formats of principals' professional learning opportunities. Importantly, rather than asking principals about formal learning opportunities such as workshops or mentoring, we asked them to describe how they continued to learn to carry out the work of a principal once they held that position. This approach allowed us to understand a principal's perspective on their learning while in their role, including what, how, and under what conditions their learning happened.

All of the principals whom we interviewed had completed university-based principal preparation programs. When we interviewed them, their experience ranged from 4 months to 18 years spent in the principalship. All participants had served in a leadership role such as assistant principal, literacy coach, department chair, or grade-level team leader prior to becoming a principal.

Prior research has documented a range of modes that principal professional learning takes. Typically, research explores *formal* opportunities, by which we mean learning opportunities that are planned, structured, and sponsored or directed by an organization such as the school district or the state. Workshops, district-sponsored networks or communities of practice, state-sponsored mentoring and coaching, and university courses are all examples of formal learning opportunities (e.g., Grissom & Harrington, 2010; Lewis et al., 2020). Prior studies suggest that these sorts of opportunities are relatively common (Darling-Hammond et al., 2022).

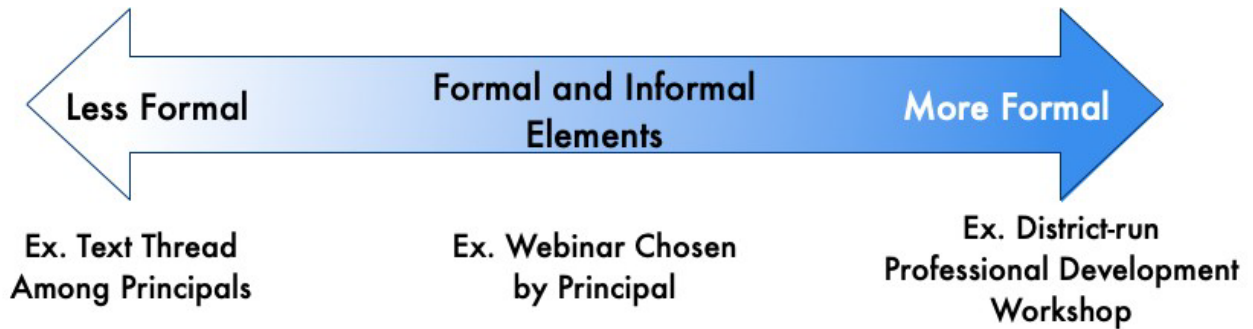
A few studies, however, have recognized that principals also learn *informally* (Çamur & Göğüş, 2025; Rodriguez-Gomez et al., 2018; Kamin & Donaldson, 2025; Ringling et al., 2021). These studies suggest that informal learning is important to principals and occurs frequently. It often originates from a need in the principal's school and tends to be practical and solution-focused.

As we define it, *informal learning* is initiated by the principal, not their organization, and tends to be unstructured. For example, informal learning might happen when a principal reaches out to a colleague for ideas or when they read an article they find online. Studies demonstrate that principals frequently engage in informal learning through discussions with trusted contemporaries and more senior colleagues in groups or one-on-one (Kamin & Donaldson, 2025).

We envision the formality of principals' learning opportunities to exist on a spectrum, from district/state sponsored, highly structured, mandatory trainings on one end to self-directed, unstructured, organic learning opportunities at the other.¹ In the middle are learning opportunities with both formal and informal elements. We depict this conceptualization in Figure 1.

¹ See Kyndt et al., 2016, for an informative analysis of teachers' informal professional learning.

Figure 1. Characteristics of Formal and Informal Professional Learning



Across the three states, principals reported experiencing an array of formal learning opportunities. Principals also reported considerable informal learning opportunities. Additionally, many learning opportunities featured both formal and informal dimensions, such as when principals initiated spontaneous, work-related discussions with their colleagues during breaks at a district-organized workshop.

This blend of formal and informal learning is not unique to the principalship. Others have documented how professionals across a range of roles from nurses to medical residents to lawyers learn from both formal opportunities and informal experiences (see, Daley, 2001; Froehlich et al., 2023; Teunissen et al., 2007). The principal role is perhaps distinct from these other fields in its breadth of span of control and lack of role-like colleagues in close proximity. These factors may tilt the learning of principals toward the informal.

Principals' engagement in formal and informal learning varied. Some of this variation was attributable to characteristics of principals or their schools.

We discuss our findings regarding principals' modes of learning in more detail below.

Principals had access to a range of formal learning opportunities.

Principals engaged in many formal learning opportunities. In the survey, we asked a nationally representative sample of principals from across the U.S. about their access to nine different modes of learning. We detail these modes of learning in Box 1.

Box 1. Learning Opportunities on the National Survey

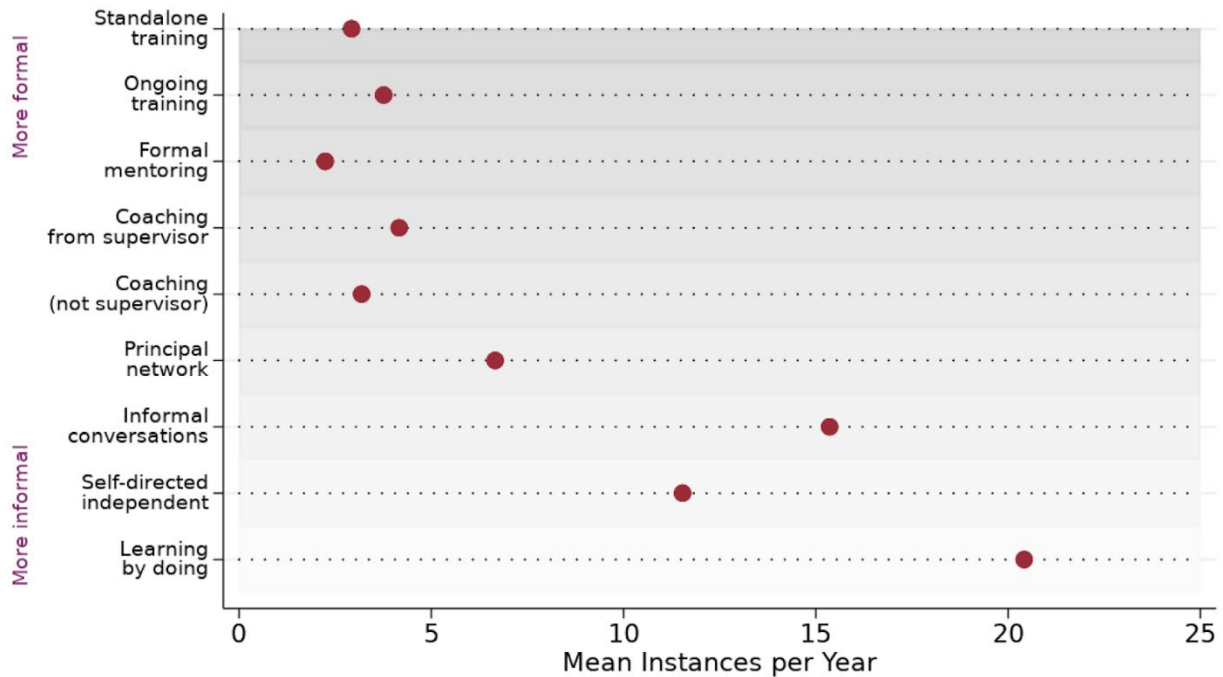
The national survey asked about a set of learning modes we identified from principal learning research and initial interview findings. Figures use shortened names for these categories, written in bold. The survey included the full text.

1. **Standalone** workshops, conferences, or **trainings** (that is, “one-off” rather than ongoing, cumulative learning opportunities)
2. **Ongoing** workshops or **trainings** that are part of a series and build cumulatively on one another
3. Participating in a **principal network** or community of practice organized around common learning goals (e.g., a group of principals organized by the district, an outside organization, or online)
4. Receiving **coaching from a supervisor** (e.g., engaging in observation and feedback as part of a supervisor’s school visits or district evaluation processes)
5. Receiving **coaching** from someone other than **[not] a supervisor** (e.g., engaging in observation and feedback with a district or external expert, school rounds with district or external support personnel)
6. Receiving **formal mentoring** from a more experienced leader (not a supervisor)
7. **Informal conversations** (e.g., in person, virtual, via text) with peers, informal mentors, or supervisors with a learning component
8. **Self-directed independent** learning (e.g., via books, podcasts, YouTube)
9. **Learning by doing** on-the-job (i.e., trying a new practice or tool and assessing its efficacy)

Figure 2 shows the results for principal engagement in each of these nine learning opportunities. In the figure, these learning opportunities are arranged from those that are almost always formal (such as attending workshops or training) to activities that can be either formal and informal (such as coaching and networks) to those that are almost always informal (such as self-directed independent study).

The dots show the average across the sample and indicate that, for example, the average principal received 2.9 instances per year of standalone training or workshops in each content area. Figure 2 shows that principals tended to receive fewer formal opportunities. As we look at opportunities that can be formal or informal, we see the frequency increase. Specifically, principals met with their networks an average of 6.7 times per year to discuss each content area, compared to 2 to 5 instances for trainings, formal mentoring, and coaching. Engaging in professional learning more frequently does not necessarily guarantee that principals will learn more content, or learn it more deeply, but frequency does indicate how often principals are being provided with or seeking out opportunities for learning. While our survey data cannot speak to the intensity, duration, or quality of principals’ learning opportunities, examining frequency allows us to compare principals’ access to learning opportunities, which are necessary precursors to learning.

Figure 2. Frequency of Principals' Participation in Different Modes of Learning, Averaged across All Content Areas



Source: Nationally representative sample of principals from RAND's American School Leader Panel. Principals were asked: "Over the last two years, how frequently did you participate in each of the following potential learning opportunities on [content domain]?" for each of five content domains. The response scale was *Never, Once per year, 2 – 4 times per year, About once a month, 2 – 3 times per month, or Once a week or more*. The figure converts the scale to an approximate count of instances of each learning mode per year and averages over the five content domains.

Principals in our qualitative, three-state sample reported receiving a variety of formal learning opportunities. One Tennessee principal described the range of opportunities this way:

We participate in district leadership meetings as a leadership team. That's monthly... We engage in instructional rounds each month at each school; we rotate those around. And then we have virtual opportunities. It'll be a little quicker, but kind of a touch point of what we're doing as a group. And we have made the expenditure with the Solution Tree the last couple of years, which has been a huge support to us. We've been able to go to the conferences, and then we've had the consultants come in.

This one principal's experience included district leadership meetings, instructional rounds, conferences, and sessions with consultants—all formal learning opportunities.

Across all three states, principals commonly reported that principal supervisors, the district leaders assigned to evaluate and supervise principals, facilitated their learning within networks or one-on-one. It is increasingly common in midsized to large districts for principal supervisors to evaluate and coach principals. While

principal supervisors focused on evaluating principals and ensuring compliance and accountability in the past, the role has shifted to a more developmental, coaching approach (Goldring et al., 2018). In smaller districts, the tasks of a principal supervisor are often assumed by an assistant superintendent or, in very small districts, the superintendent. One Washington principal described working with their supervisor this way:

[My principal supervisor] would come in with a protocol to extend our learning, and a protocol I can actually use with my staff. So you're leading your learning, not just learning [yourself]. You're actually getting tools for your toolbox to lead professional learning. And then we would do classroom walkthroughs.

In this case, the supervisor both supported principals to learn new content and modeled leadership practices.

Other principals' learning occurred in networks outside their districts, sponsored by outside organizations. A Connecticut principal described learning through a network facilitated by a national organization:

I was doing some principal continuing learning with Teach for America alumni, and through a couple of their organizations, one called Leadership for Educational Equity. It was a fellowship and it was a cohort model. We went to three different sessions, one in Houston, one in New Orleans, but essentially cohorted with education leaders from other parts of the country. And that was really helpful to talk with people who were ambitious and had, like me, a little bit of an unconventional path to and through the principalship and to try and problem solve.

Here, the principal network consisted of a national cohort of leaders with similar professional experiences and goals. Other principals described participating in online networks or local networks made up of principals from different districts.

Informal learning was a major component of principal learning.

As discussed above, informal learning is self-directed and often (but not always) unstructured. Figure 2 suggests that learning opportunities with informal characteristics occur frequently. Principals reported participating in learning by doing, informal conversations, and self-directed independent learning at least 12 times per year, compared to 2–5 times a year for the most formal learning types.

It makes sense that principals would have more frequent access to informal learning. It requires considerable resources for districts or states to plan, design, and implement formal learning opportunities. In contrast, principals may engage in informal learning opportunities without notable external resources and on a much smaller scale. Given the resources required and their scale, formal learning

opportunities will likely always be less frequent than informal ones. While predictable, these survey data underscore the prevalence of informal learning opportunities for principals and raise interesting questions about the relationship between principals' formal and informal learning activities. Similar to our survey findings, across our interview sample of 63 principals, informal learning was also very common. One Washington principal described their learning as "50% [informal] study, 30% talking to other people, other principals, just sending emails or texts or questions. And then 20% formal learning."

Principals' descriptions of their informal learning varied. Most principals in our sample reported pursuing informal learning through reading books on leadership or other topics of interest. They also frequently listened to podcasts. A Connecticut principal commented:

[T]his morning I was listening to this entrepreneur that he interviewed and they're talking about how we go after what we want to do, but we don't take care of ourselves. We do not take care of ourselves in terms of our health. And I think that's something that is transferable, as far as I'm concerned as a leader, because if I don't have my oxygen mask on, I cannot help my staff. So I try to listen to these podcasts and I'll translate it into my work as a leader.

Principals pursued informal learning from a range of sources, from academic articles to social media.

In addition to solo experiences such as reading books and listening to podcasts, principals reported pursuing informal learning with their colleagues. Conversations with peers, including exchanges via text, were mentioned frequently as a source of learning. For example, one Connecticut principal shared:

Well, there is texting. And then sometimes it's just like, "Hey, do you have 5 minutes?" and then you pick up the phone and be like, "well, listen to this, I just saw this happen in a lesson. How would you give feedback on that?" or "What would you do if you saw this?"

These kinds of short, informal interactions with colleagues helped principals build understanding of different facets of their work.

Often, these informal opportunities focused on a pressing problem of practice. For example, principals in our interview sample also reported that they engaged in informal learning through observation of others in their context. One Tennessee principal described the role of observation as:

Just watching people around me—leaders, my principal peers—watching how they take care of business. Seeing things that are good, seeing things that aren't good, and learning from those, but for the most part seeing things that work really, really well, and then just stealing the heck out of everybody else's great ideas.

Principals often face urgent, unexpected challenges. It is likely that informal learning interactions help them learn to be able to respond to immediate needs.

Lastly, many principals reported that they learned informally by carrying out the tasks of their role and, in some cases, trial and error. For example, several principals reported that they had learned about instruction by conducting observations in classrooms, including this Tennessee principal:

I learned by doing the wrong thing a lot. I've learned that your feedback has to be short and specific in order to be implemented...I learned that because I saw any other feedback just wasn't being inputted. It wasn't being utilized.

Through learning-by-doing, principals developed knowledge and skills in the course of their regular work.

Across these instances of informal learning, principals often reported that they sought out learning to address emergent needs. This Washington principal provided an illustration:

The district gave me a PLC [professional learning community], and we do this formal, like 10 or 12 of us, and we go to four buildings throughout the year. But I also made this other one because we're all Title I schools, we're in the Valley area. So I just sent them an email, "Can we sit and talk about our real stuff? Okay, we're going to be at your school. What would you really like us to talk about?" I've gotten ideas from those, ideas for texts to study, or ideas for specific things that different staff can do, to tweak their behavior, to change an outcome.

Here, and in many other cases, principals' self-identified needs drove them to initiate their own informal learning. Taken together, our survey and interview data suggest that informal learning opportunities were common. Principals' comments also hint at the interplay between these different types of learning.

Principals' formal and informal learning was often connected.

As suggested by the case above in which the Washington principal built on a district-sponsored PLC to create her own informal network of colleagues to discuss "real stuff," principals' formal opportunities appeared to facilitate informal ones.

Formal networks or professional learning communities stimulated the development of informal learning networks. For example, one Washington principal explained the learning value of conferences:

I go to conferences a lot. I'll go to conferences and I'll go because I talk with my peers.... Very often I go to my peer and ask, "How are you implementing? What are you [doing]? How are you coaching?" And we'll do that thing compared to reaching out to a [principal supervisor] that is supposed to help me lead.

Principals reported that they drew on the relationships that they developed during formal learning sessions for informal learning.

In fact, some of the professional networks they built through formal learning provided benefits long past the conclusion of formal sessions. For example, after one Tennessee principal described formal, university-run professional learning opportunities that they had participated in, they explained:

A lot of times, those things ran multiple years. And the sessions we would go to were great, but a lot of times the collaboration was probably the best part, getting to collaborate with other principals around the state and around the country.... Some [relationships from those programs] still continue. Connections that I made with people I know, who have schools similar to mine and similar struggles, that I can still reach out to and get information.

This principal's informal learning via emails, texts, and phone calls was possible because of the connections fostered by the formal structure that brought principals together in the first place. This aligns with research by Horn and colleagues (2025) regarding the ways in which formal learning that emphasizes educators' conceptual agency can facilitate connections among educators that prompt subsequent informal learning.

Additionally, principals reported that formal learning opportunities spurred their own independent explorations as ongoing, informal learning. A Tennessee principal recalled:

I went to the Model Schools Conference in Orlando last summer, and of course, some sessions you go to really aren't applicable at all, and then some are. One that I really enjoyed was Monica Genta. And she's written several books about just bringing awesomeness back to schools. And a lot of her books are more focused on doing that for the kids. But just through reading those, her materials, and even her blog, her website, watching her TikTok videos and YouTube videos, just finding ways to make work more of a fun place for teachers.

Here, a principal's formal learning opportunity led her to seek out more resources to continue her learning on her own.

Lastly, some principals, particularly those working in rural districts with smaller central offices, reported that some of their best learning took place when they were asked to serve on policymaking or planning committees at the district or, in a few cases, the state level. While these experiences were not designed as leader learning sessions, principals described how conversations in these committees deepened their understanding of content. These collaborations also helped principals develop insight into how these initiatives could be implemented at their schools.

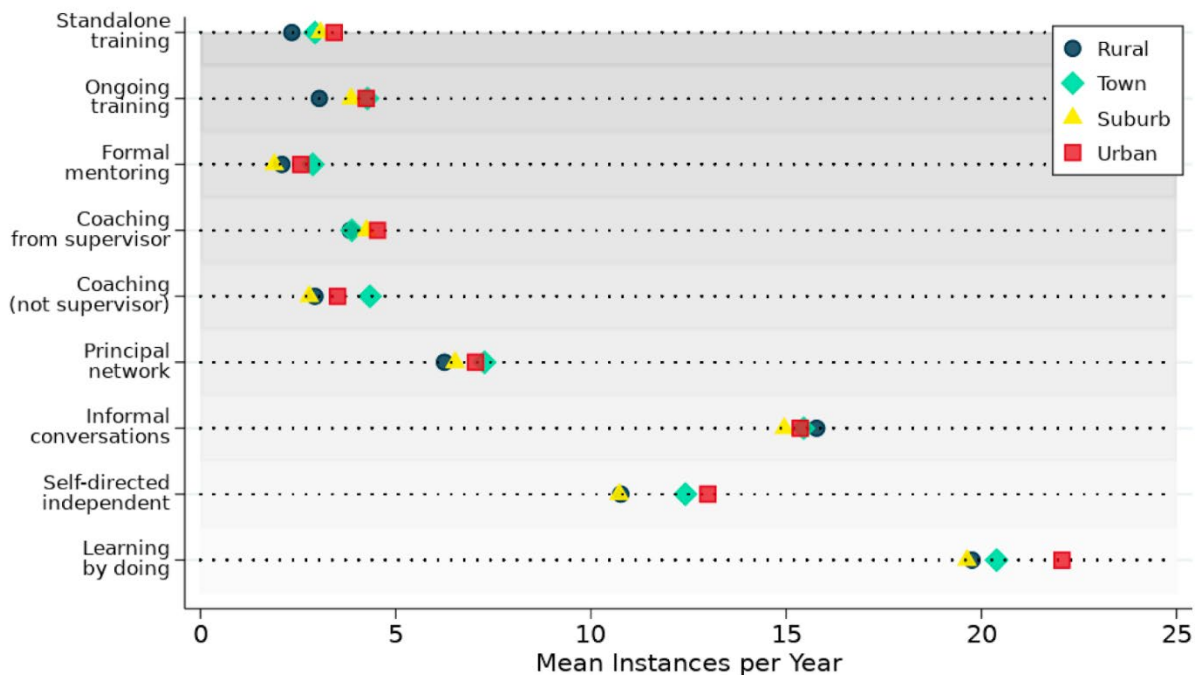
Principals' access to professional learning varied by characteristics such as school locale, principal experience, and principal race/ethnicity.

Our nationally representative survey sample permits analysis of principals' access to professional learning across contextual and individual characteristics. Like Darling-Hammond and colleagues (2022), we found that access to formal learning opportunities varied. Interestingly, we found that individuals' access to informal learning also differed.

Rural principals had less access to formal learning opportunities than urban principals, but this difference was small.

Figure 3a shows how often principals in different locales participated in each mode of learning; as with Figure 2, this analysis averages across content areas. Figure 3b homes in on the less frequent learning modes so that readers can better distinguish the differences among them. The figures show that rural principals in our sample experienced less frequent professional learning opportunities, especially among more formal opportunities, than their counterparts in urban or suburban schools.

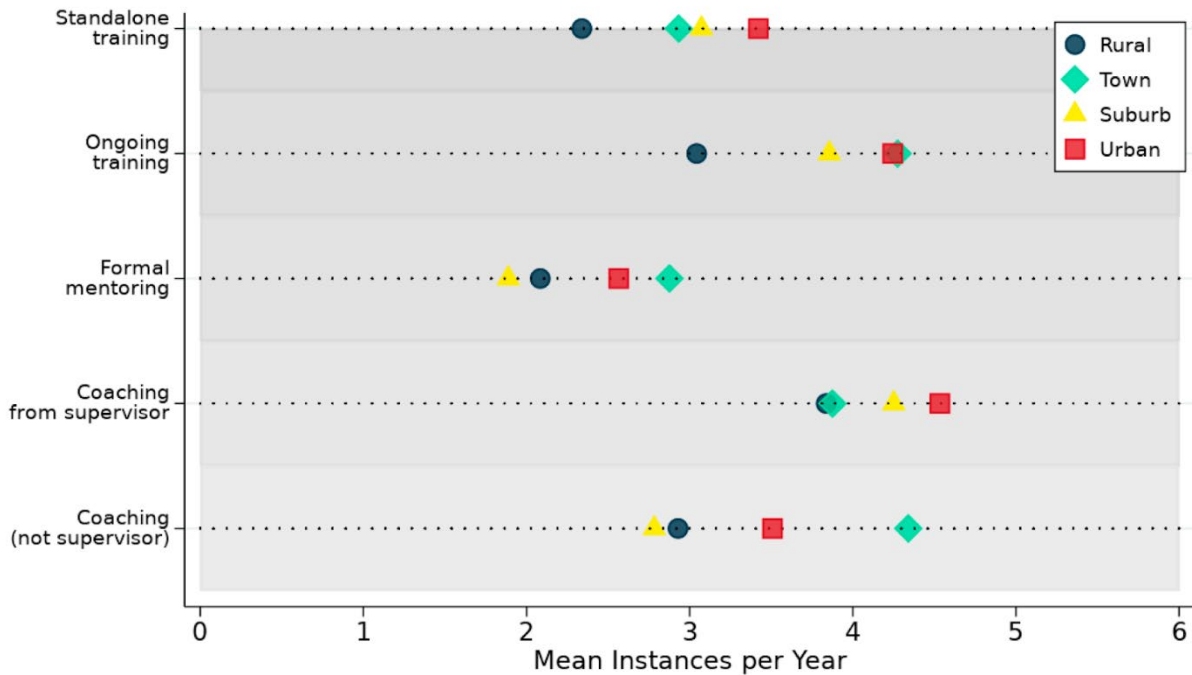
Figure 3a: Frequency of Learning Modes, by Locale Type



Source: Nationally representative sample of principals from RAND's American School Leader Panel. Principals were asked: "Over the last two years, how frequently did you participate in each of the following potential learning opportunities on [content domain]?" for each of five content domains. The response scale was *Never*, *Once per year*, *2 – 4 times per year*, *About once a month*, *2 – 3 times per month*, or *Once a week or more*. The figure converts the scale to an approximate count of instances of each learning mode per year and averages over the five content domains.

For example, as shown in Figure 3b, the average rural principal attends about 2.3 standalone training sessions per year (averaged across all content areas), while the average urban principal attends about 3.4. Similarly, rural principals reported one fewer instance of ongoing training, formal mentoring, coaching, and network meetings over the course of the year. Although small, these differences add up to fewer of the generally more formal learning opportunities for rural principals.

Figure 3b: Frequency of Learning Modes Among Less Frequent Learning Modes, by Locale Type



Note: This figure replicates a subset of the learning modes shown in Figure 3a. It shows the less frequent learning modes only with a truncated scale for ease of comparison.

Even among more informal opportunities, rural principals reported lower frequencies than their urban colleagues, at least for self-directed independent study and learning by doing. The exception was learning via informal conversations, which they reported more frequently than principals from other locale types.

The generally lower access to formal learning opportunities was described by several of our interviewees from rural schools. As one principal in a rural Washington district noted:

I've had some really rich experiences over the years at out-of-town conferences, and that's completely stopped. Our district can't afford even to go to [our local leadership conference]. My counselor wanted to go to a training... I can't afford it, you know? So that's unfortunate, because you can

only do so much in-house. Sometimes you really need the expertise or hearing it from a different voice.

Other principals reported that informal learning opportunities could help fill in when formal learning was less available. Another principal from a small rural district in Washington explained:

We do a lot of that [professional learning] collaboratively in my building, which is great. We, as a district, we're just small. We don't have the larger district office systems, like, if I look at a bigger district like [a local urban] school district, they have armies of humans that can do instructional coaching or PD development. It's like, no, there's just us.

As this principal suggested, the differences in learning opportunities may be due to differences in districts' capacity to offer learning opportunities for their principals. However, some rural principals did report that the smaller central office structure made it easier to learn directly from their superintendents or assistant superintendents. Additionally, rural districts frequently reported making up for limited internal capacity by contracting with outside sources for professional learning for their principals.

Early-career principals received more coaching and mentorship.

Our survey data show that early-career principals reported accessing mentorship and coaching opportunities more frequently than their later-career colleagues. Early-career principals, or those with 5 years or fewer of experience in the role, are represented by the dark blue dot in Figure 4. This group reported engaging most frequently in standalone trainings, formal mentoring, coaching, informal conversations, and learning-by-doing. The differences are especially stark for coaching: early-career principals tend to receive about two more sessions of coaching per year than mid-career or experienced principals.

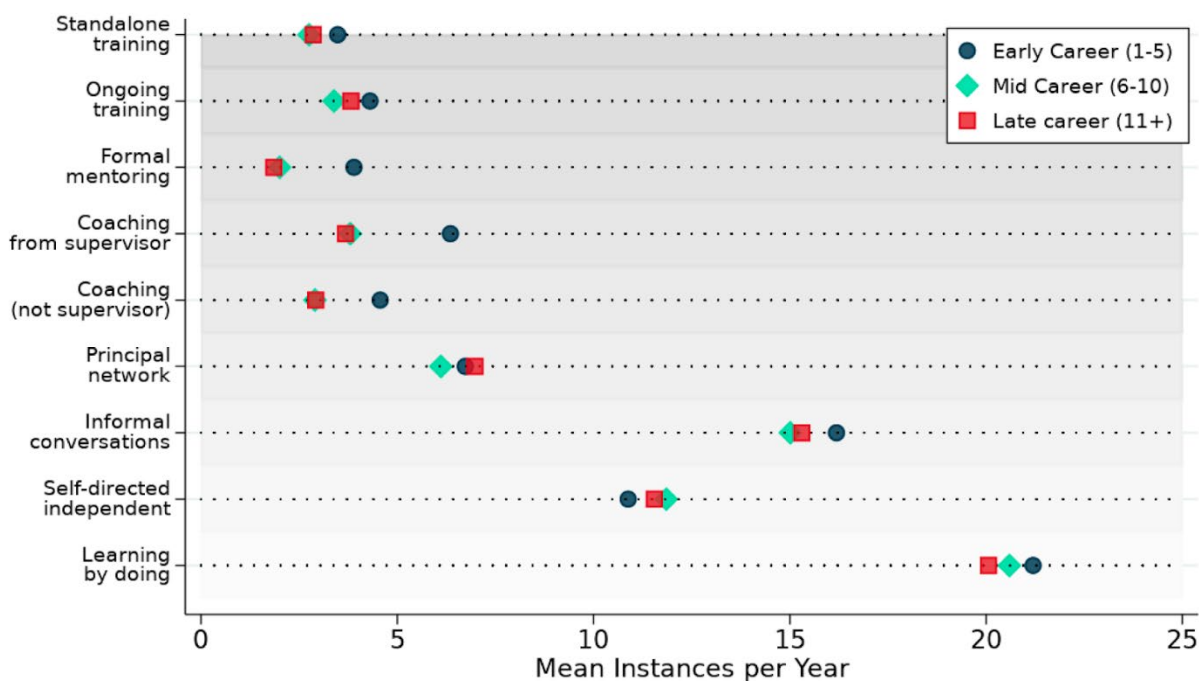
In contrast, engagement with different modes of informal learning is more similar across principals with different experience levels. Principals in each career stage, from early career to veteran, reported engaging frequently with informal learning.

Our interviews confirmed this finding, with veteran principals reporting a wide variety of informal learning. Some principals reported new policies they needed to learn about—like inclusion of students receiving special education services or transitioning to dual language instruction—and others reported seeking out new learning to support their growth. For example, a long-serving Tennessee principal explained how experience opened her eyes to the need to fill an expertise gap:

As I got those first couple years under my belt and really learned what I was doing, I was able to see other successful schools and principals across the state, and I saw that this PLC model was really effective for them. So I started doing some research.

The principal's research led her to a new PLC model for her teachers.

Figure 4. Frequency of Learning Modes, by Principal Experience



Source: Nationally representative sample of principals from RAND’s American School Leader Panel. Principals were asked: “Over the last two years, how frequently did you participate in each of the following potential learning opportunities on [content domain]?” for each of five content domains. The response scale was *Never, Once per year, 2 – 4 times per year, About once a month, 2 – 3 times per month, or Once a week or more*. The figure converts the scale to an approximate count of instances of each learning mode per year and averages over the five content domains.

Veteran principals also explained that acting as a resource for other leaders supported their learning. As one mid-career Connecticut principal said:

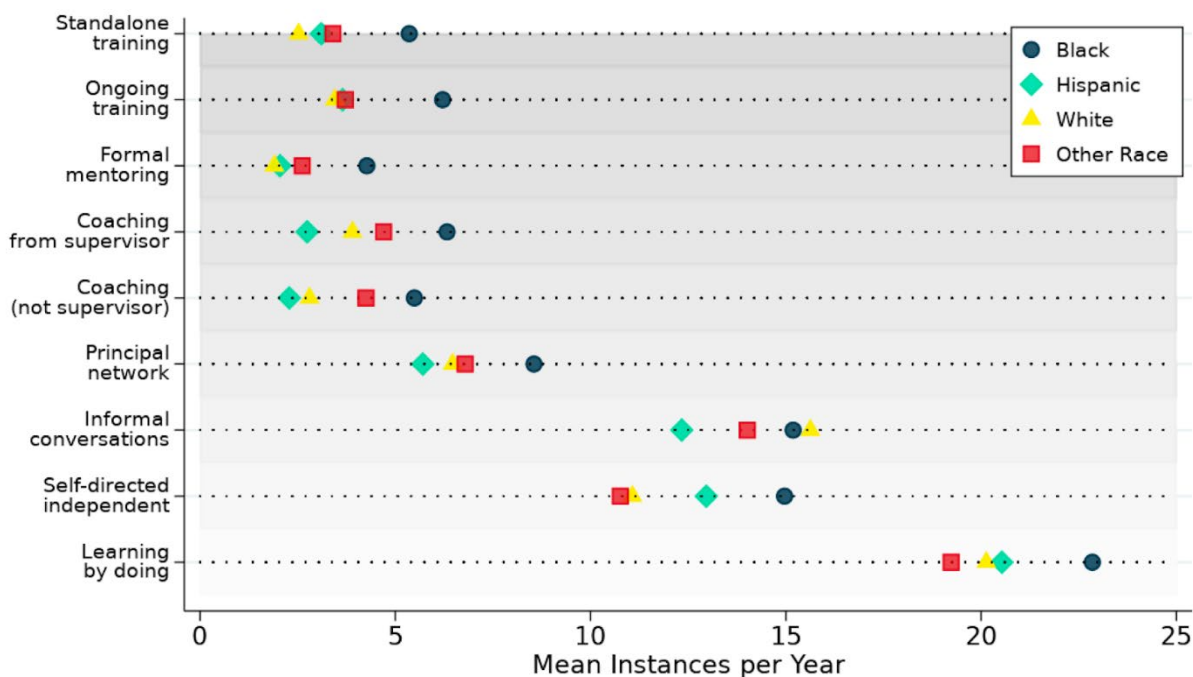
Right now I have somebody reaching out to me, another assistant principal, because I went through the whole problem with the teacher and they want to put someone in a plan. And the funny thing is, her principal is my mentor and he referred her to me because he never had to do this before and because I went through it...so we teach each other.

These modes of intergenerational mentoring may allow for mutual learning as principals support other leaders while still growing themselves.

Black principals reported receiving more of all modes of learning.

In the survey data, principals who identified as Black reported receiving more frequent learning opportunities across many modes and content areas. This pattern is evident in Figure 5, which averages learning modes across content areas and reports frequencies by major racial/ethnic groups. Black principals are represented by the dark blue dot. The only learning mode for which Black principals did not report more learning than other principals was informal conversations.

Figure 5. Frequency of Learning Modes, by Principal Race/Ethnicity



Source: Nationally representative sample of principals from RAND’s American School Leader Panel. Principals were asked: “Over the last two years, how frequently did you participate in each of the following potential learning opportunities on [content domain]?” for each of five content domains. The response scale was *Never*, *Once per year*, *2 – 4 times per year*, *About once a month*, *2 – 3 times per month*, or *Once a week or more*. The figure converts the scale to an approximate count of instances of each learning mode per year and averages over the five content domains.

We initially conjectured that these patterns might be due to differences in the schools and districts where principals of different races work. For example, Black principals more often work in large, urban districts, which we found to offer more learning opportunities more frequently than smaller, rural districts (see Figure 3a). However, even when we accounted for district, school, and other principal characteristics, we still found that Black principals reported participating in more professional learning, although with slightly smaller differences. This difference could be due to contextual characteristics that we did not measure, an artifact of survey construction, or an unknown difference in the experiences of Black principals that further work could better explain.

In sum, we found that principals experienced a range of formal and informal learning opportunities. Formal opportunities included workshops, networks, coaching, and mentoring. Notably, formal learning activities were sometimes district directed and organized, and at other times initiated by a principal but organized by an entity outside the district, such as a professional organization or local university. Informal opportunities often took the mode of conversations with trusted colleagues, reading books, and listening to podcasts and were always initiated by principals rather than districts—though they were sometimes prompted by formal

learning opportunities. We hypothesize that informal learning opportunities may prove especially relevant and useful to principals because they address principals' current demands. We explore this hypothesis further in subsequent sections. Moreover, formal learning opportunities often spurred informal learning, like when principals' professional conversations flourished during breaks in a workshop or when a formal leadership network spawned informal text threads among participants. We are left with a picture of principal learning that is largely informal, with much of the learning occurring through observation, learning by doing, and self-directed, independent exploration. This raises questions regarding the extent to which principals' learning adequately serves their needs or the needs of their schools, which we take up in the discussion.

Content Addressed in Principals' Professional Learning Opportunities

In the previous section, we documented principals' formal professional learning opportunities offered by the school district and informal learning activities accessed at the principals' own direction. Next, we examine how different leadership content was covered across these different modes.

It would not be feasible to ask principals about all content they may need to learn about. Instead, we focused on the four domains of principal practice that Grissom, Egalite, and Lindsay's (2021) review suggested are most clearly associated with more positive student achievement and other outcomes. These four domains are:

1. ***Instructionally focused interactions with teachers***: characterizing principals' interaction with teachers regarding instruction through such activities as observation, feedback, coaching, and reviewing data.
2. ***Building a productive climate***: describing how principals create a school environment that fosters trust, efficacy, teamwork, engagement with data, organizational learning, and continuous improvement.
3. ***Facilitating teacher collaboration and professional learning community***: relating to how principals promote teacher collaboration that systematically focuses on improving teaching practices to enhance student learning.
4. ***Strategic management***: delineating how principals allocate and manage resources, including time and staff.

Additionally, we explored a fifth area that Grissom et al. (2021) identified as emerging and which numerous other studies have underscored as an important domain of principals' work: leading for equity (e.g., Khalifa, 2020; Irby, 2022; Radd et al. 2021). Despite an increased focus on leading for equity in the last two decades, defining and determining whether and how school leaders should pursue this aim remains contested, both in the scholarly realm and increasingly in principals' work environments. We delve into this tension in more detail below. For this report, we define ***leading for equity*** as how principals shape school-level policies and practices with the goal of fostering educational opportunities that lead to excellent social and academic outcomes for each and every student, with particular attention to students from historically marginalized communities. This domain is both a content area that principals learn about on its own (on dimensions such as self-reflection, systems-thinking rather than individual-thinking, or community-engaged practices) as well as a set of approaches evident in the other four domains (such as equitably distributing resources or supporting culturally relevant instructional practices).

In our interviews with principals, we asked about their learning in each of these five domains. Because we emphasized these five domains, some other important topics for principal learning likely did not surface in our data collection. For each domain, we asked what specific content they had learned in that area, the modes it took, and their assessment of the usefulness of that learning opportunity. We recognized that learning opportunities across domains would often be overlapping, but we asked

about each one distinctly to ensure we captured learning opportunities in each domain of the Grissom et al. (2021) framework.

Below we describe three salient findings from the interviews with support from survey data: engagement with instruction was the main focus of principal professional learning, learning in other areas was less frequent and often informal, and opportunities to learn about leading for equity were less frequent and depended on context.

Engaging with instruction was the main focus of formal and informal principal professional learning.

Across the principals we interviewed, we found that professional learning most often centered on instruction and principals' instructional engagement. This was true across the formal and informal learning continuum. Virtually all principals in all three states reported that they received formal professional learning about instruction. As one Tennessee principal reported, "I feel like the instruction part we've got, hands down; [our district staff] really talk a lot about the instruction part." Teacher observation and coaching were the most frequent training topics in Tennessee. A Washington principal described ongoing district-led training focused on instructional improvement:

We meet and go through, "Here's our criteria. Here's what our expectation of what a teacher meeting [the criteria] looks like. Here's what a growth plan should look like in our building. Here's how many times you should be observing those people. Here's what your observation notes and coding should look like." And so we really calibrated with each other.

Principals across all three states described similar professional learning sessions focused on developing their skills around observing and providing feedback on instruction. Principals also reported receiving district- and state-sponsored professional learning about instructional topics like special education, multilingual learner support, and literacy, although these opportunities were often targeted to teachers' needs rather than addressing leadership.

Many (although not the majority of) principals received instruction-focused learning opportunities in the mode of a professional learning community organized by their district, state, or other organization to approach instructional problems of practice. Sometimes called Principal Learning Networks (PLNs) or Principal Learning Groups (PLGs), these sessions typically involved visiting each other's schools and discussing current problems of practice. According to principals, sessions often included classroom walkthroughs to focus on specific aspects of instruction. Discussion was commonly facilitated by an assistant superintendent or principal supervisor who modeled instructional leadership practices. One Tennessee principal described these sessions:

That kind of developed from us doing English walkthroughs as a district, where I might go to one of the other high schools and walk through with their admin, and then vice versa, and someone from the central office. I think that gave me the confidence to know “Hey, I can do this and give [teachers] actionable feedback that they can implement in 48 hours.” So before doing it on my own, I guess I kind of did it with others.

We observed that principals' reporting of the quality of their learning in these groups varied by district and based on the skills of the facilitator. For instance, a Washington principal distinguished between two PLNs they participated in. He described how their first facilitator provided protocols to highlight specific aspects of instruction during walkthroughs and discussion. In contrast, their second facilitator provided less direction. They commented, “I had another PLN where a director was like ‘Choose your destiny. It’s your time, what can we do here today?’ People like me, I like to be pushed. I don’t know what I don’t know...” While the PLN mode was the same, this principal found the first director’s structured facilitation more helpful than the unplanned approach of the second director. As this Washington principal’s experience demonstrates, while many principals learned about instruction through PLNs or PLGs, the quality of these learning opportunities depended on their facilitation.

In addition to state- and district-sponsored learning focused on instruction, principals reported that they often learned through collaboration with knowledgeable teachers, assistant principals, and instructional coaches at their schools. One Washington elementary principal who had a secondary teaching background described learning about teaching children to read—not something he learned as a secondary teacher—from an assistant principal and instructional coach:

[The coach and assistant principal] are my cornerstones of everything that I need to know, and meet with them literally daily; multiple times daily. Sometimes I feel like they’re talking a foreign language, but they’re willing to talk through it with me, sometimes multiple times every week till it starts to make sense for me regarding instruction, interventions...They see micro things I’m not able to see regarding elementary because it’s just different...like in secondary, we’re teaching kids to learn how to comprehend reading, right? Whereas at the elementary level, especially the lower grades, you’re teaching kids how to read.

Principals stated that they often relied on colleagues with specialized instructional knowledge, such as those with content expertise or experience with a particular curriculum, to help them learn.

Principals also reported learning about instruction by studying curricular materials, standards documents, books and research articles, online resources, and podcasts. A first-year middle-school principal described how they used books to support their instructional leadership:

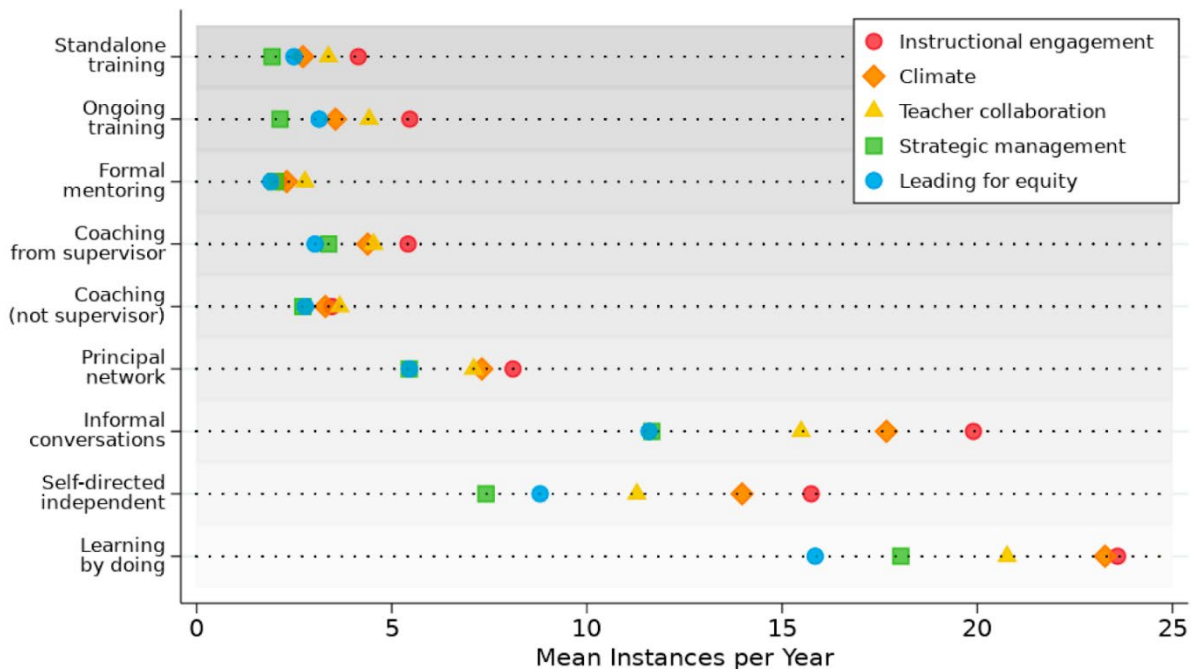
I use a lot of books... I’ve really been liking Unsettling Settler-Colonial Education. I’ve been deep in this book, it’s dope and it’s really been helping

me...I do a lot of quick walkthroughs, so that I cannot just use formalized observations, but also just informal, formative kinds of assessments of my staff as a whole. This book has really helped me kind of narrow down what it is that I'm looking for.

Principals described using these types of resources to delve more deeply into instructional topics introduced in PD sessions or to explore topics of personal interest that were not addressed in their more formal learning opportunities.

Our national survey results confirmed that principals' learning most frequently focused on instructional interactions with teachers. Figure 6 plots how frequently the average principal reported learning about each of the five content areas across nine modes of learning.

Figure 6a: Frequency of Professional Learning Content Coverage, by Mode



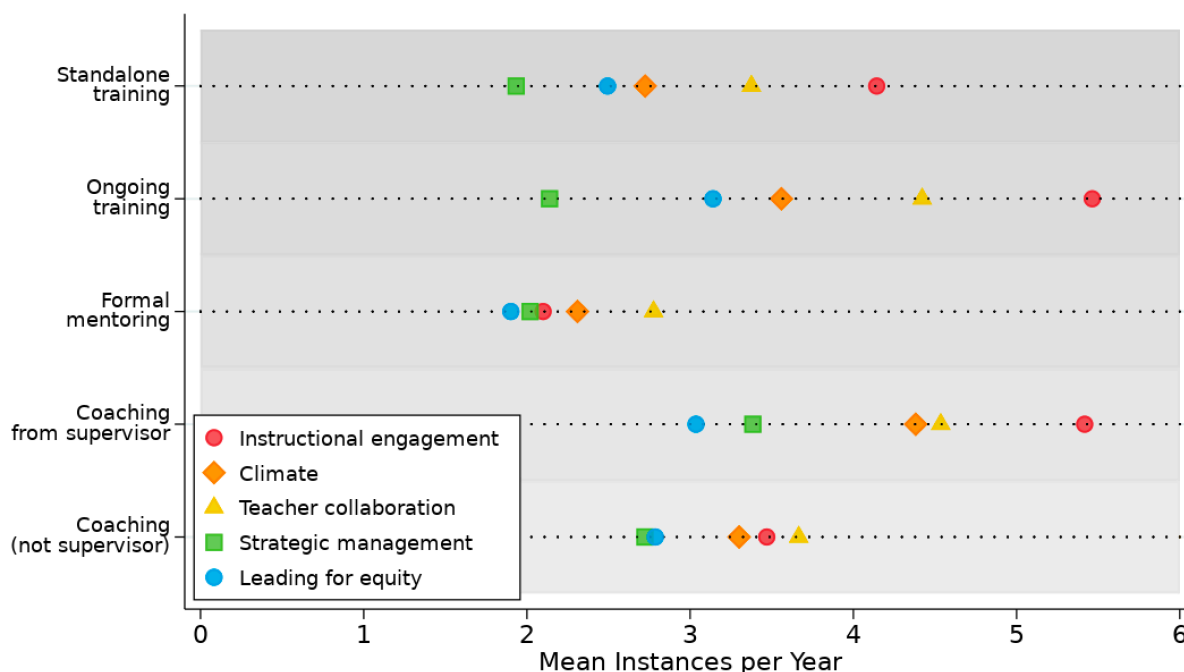
Source: Nationally representative sample of principals from RAND's American School Leader Panel. Principals were asked: "Over the last two years, how frequently did you participate in each of the following potential learning opportunities on [content domain]?" for each of five content domains. The response scale was *Never*, *Once per year*, *2 – 4 times per year*, *About once a month*, *2 – 3 times per month*, or *Once a week or more*. The figure converts the scale to an approximate count of instances of each learning mode per year for each of the five content domains.

Learning about instructional interactions, represented by the red marker, is typically to the right of the other content areas, indicating more frequent learning opportunities. The higher frequency of this content is evident for standalone and ongoing workshops, principal network meetings, supervisor coaching, and all the learning opportunities on the more informal side of the continuum. Non-supervisor coaching and formal mentoring are exceptions to this pattern; the dots for those

modes of learning are clustered together, indicating that the frequency of those types of learning is similar across content areas. However, the overall pattern is that principal learning most frequently addresses instructional interactions with teachers.

Because Figure 6a contains multiple items with a broad range of mean instances per year, it is hard to see the distinctions between the content coverage in several of the modes. We therefore zoom in to show the five modes that occur less frequently to make the differences more visible. These modes are shown in Figure 6b.

Figure 6b: Frequency of Professional Learning Content Coverage for Less Common Modes, by Mode



Note: This figure replicates a subset of the learning modes shown in Figure 6a. It shows the less frequent learning modes only with a truncated scale for ease of comparison.

Learning about building climate, teacher collaboration, and strategic management were less common and often informal.

Principals reported that the frequency of professional learning about building school climate, teacher collaboration, and strategic management was less common than learning about instructional engagement. Moreover, principals more often described their learning opportunities in these content areas as informal. These patterns were reflected both in the national survey data, as shown in Figure 6, and in the interview data. As described above, instructional engagement occurred most frequently across each of the modes, represented by red dots in Figure 6. The frequency of learning about climate (orange dots) and teacher collaboration (yellow dots) varied,

whereas principals consistently reported less frequent opportunities to learn about strategic management (green dots) than those other topics. While learning sessions focused on these topics occurred less often than learning opportunities focused on instructional engagement with teachers, principals did still report learning opportunities, as illustrated in the qualitative data below.

School Climate. Principals described learning about building climate differently across our three states. In both Tennessee and Washington, principals reported that it was unusual to receive formal learning about school climate, whereas in Connecticut more than one-third of principals reported that they received formal learning in this area.

In settings where formal learning opportunities focused on school climate were uncommon, principals relied on their lived experience, informal conversations, and on-the-job learning. As a Tennessee principal stated: “That one has been trial and error. ...To my recollection there has been no training that I’ve received as an executive principal around a strong culture and climate.” A Washington middle school principal who had recently won a district award for school climate and culture affirmed that his skills in this area largely came from his life experience rather than any formal training:

Zero learning experiences around culture, not one thing. They [central office] talk about classroom culture and engaging students, but...zero professional development on culture...thinking outside the box to create places and spaces where people want to be, that’s just my niche.

Another Washington principal described a similar informal approach to learning about school climate:

The bulk of the things I learned about climate and culture was learned by myself, some readings I’ve done, but also checking in with some folks, some mentors who are not here that I can check in with to see you know, what should I focus on...?

Without formal learning opportunities, principals reported largely relying on professional networks they had cultivated, lived experiences, and opportunities outside of their school contexts.

Somewhat in contrast to Tennessee and Washington, more than one-third of principals in Connecticut reported that they received formal learning about school climate. Principals described this learning as largely taking place within school-wide efforts to implement social and emotional learning strategies. For example, one principal reported:

This is the “social, emotional school.” [We’re] kind of referred to that way. We’re a Positive Behavior Interventions and Supports school. We also are trained in Ruler here from Yale University, so we have the Ruler model with the mood meter and other, you know, strategies to help kids.

While principals in Tennessee and Washington also reported putting in place school-wide PBIS and social-emotional curricula such as the Ruler model, only Connecticut principals categorized these types of trainings as learning about school climate and culture.

Teacher collaboration. Principals reported more formal learning opportunities about facilitating teacher collaboration than sessions about school climate, though much of principals' learning remained informal. Principals commonly reported that formal opportunities consisted of workshops or ongoing training sessions about supporting teacher PLCs, often facilitated by outside organizations such as Solution Tree. Informal learning included reading, consulting with local experts, and trial and error. For example, a Tennessee principal described learning from colleagues, “You really have to lean on your supervisors and your academic coaches, to know what teachers need and how we connect them in a collaborative effort with others.” Several Washington principals described learning through an informal inquiry cycle by putting a system into place, monitoring it, gathering feedback from teachers, watching how other leaders at their building facilitate, and making revisions.

Strategic management. Principals frequently described learning about strategic management topics such as budget management and personnel allocations in informal ways. Principals in both Tennessee and Washington stated that formal learning about strategic management was unusual. Instead, leaders reported that they typically learned informally by making appointments with district specialists to understand how to do a specific task, learning from existing experts in their building, or using trial-and-error. One principal from Washington expressed a common sentiment:

I feel like my experience as a principal with strategic management stuff and technical things like that, either you've somehow been exposed to it and learned it on the job because you had to, or you're presented with the fact that you better figure it out because you're responsible for it. How are you going to learn it? You are going to seek out either somebody who you trust that is good at it and have them teach you, or find the module online that you're gonna take that's gonna teach you how to do it, or the book that's gonna school you up.

Principals in Washington and Tennessee communicated that their learning about strategic management was largely motivated by necessity and relied on knowledge shared by colleagues. This finding is not surprising, considering that the field of school leadership and leadership preparation of school leaders generally have moved away from the idea of the principal as a building manager to one of the principal as instructional leader (e.g., Neumerski, 2013). Studies continue to show, however, that the everyday work of a principal continues to be heavily managerial (Grissom et al., 2025). The lack of district-sponsored learning opportunities leaves principals to find their own solutions to often complex technical challenges.

Connecticut principals reported more formal learning opportunities—about half the principals we interviewed recounted formal opportunities to learn about management topics. Multiple principals reported ongoing formal learning about

developing school systems to support teacher data use, for example, from the Center for Public Research and Leadership at Columbia University.

Learning about leadership for equity was less frequent and opportunities differed by context.

Our qualitative analysis indicates that access to learning about leading for equity depended on context. In Tennessee, formal professional learning opportunities targeted at equity were relatively scarce. One Tennessee principal stated, “I probably just learned what I know about equity from being on the job and being a human, not wanting to see anybody fail from what they're trying to do.” When they did name formal learning opportunities, Tennessee principals often described opportunities embedded in conversation around learning disabilities or developing classroom practices that support students experiencing trauma. According to Tennessee principals, these learning opportunities were rarely explicit about race, gender, class, or language. These principals suggested that informal opportunities focused on equity were also relatively uncommon.

Principals in both Connecticut and Washington reported more formal and informal learning about leading for equity than their counterparts in Tennessee. Most principals in those states reported participating in equity-focused learning opportunities, albeit less frequently than learning about other topics. Notably, every Washington principal we interviewed described accessing professional learning related to equity, and half described formal opportunities. Principals in Connecticut and Washington recalled attending workshops facilitated by their district or an outside organization. Informal learning about equity sometimes happened through professional learning networks and mentorship. Others learned through their “everyday work.” Principals of color and others who experienced social marginalization pointed to their own lived experiences as learning experiences that applied to their professional contexts.

As we expected, principals reported learning about leading for equity across content areas as well as a focus on its own. In interviews, principals categorized a wide range of initiatives and professional learning topics under the broader heading of equity. When asked about equity learning, Washington principals listed topics that included special education and inclusion, multilingual learners, positive behavior supports programs, discipline disproportionality, Native American history, and restorative practices. Similarly, Connecticut principals included training on restorative practices, addressing chronic absenteeism with a focus on “subgroups,” and racial justice training as equity learning.

The level of explicit attention to equity, and racial equity in particular, within these trainings also seemed to vary. On one end of the spectrum, principals described celebrating different cultures as equity learning. For example, a White principal from eastern Washington described informal learning through her school’s cultural celebrations, including learning from presentations given by students observing Ramadan. On the other end of the spectrum, some principals received training

focused more directly on particular inequities, such as discipline disparities, and support for specific groups of students of color. When asked about the focus of professional learning for equity, a White Connecticut principal commented:

I think for sure a lot about racial equity. And certainly right, like 2019, 2020, 2021. Not a lot of people [are] talking about it at this particular moment, but those [sessions] were very explicitly provided... The fellowship that I said was very helpful was literally called 'Leadership for Educational Equity.'

Similarly, principals in an urban district in Washington named a specific focus on broadening learning opportunities for Black boys.

Although some principals we interviewed reported receiving more formal learning opportunities related to equity and engaging in more informal learning, they did not necessarily consider the learning to be high-quality. For example, a White principal in an urban district in Washington noted that even though their district's equity focus was explicit within professional learning sessions, the message was not reinforced by policy or action on the part of the district. She commented:

I don't think [my district] does a great job talking about [equity] in a way that draws others into the conversation. I think...we talk about it in a way that it's like a hammer or a cudgel. And if you don't believe what we believe, then...I think my favorite phrase about [city] as a city community is we are very passive progressive. We're all for it until it impacts me.

Another principal in a suburban district, who identified as Black, described how equity “took a back seat” in his district—the assistant superintendent who had been in charge of equity was reassigned to different work the year prior, and the principal himself assigned the equity committee work to his assistant principal.

Our national survey showed that among the five content areas across modes, principals had the fewest number of opportunities to learn about leading for equity. As illustrated in Figure 6a, principals consistently reported that equity-focused learning opportunities (represented by the blue dots) were less frequent than opportunities to learn about instruction, climate, and collaboration. In short, both the survey and interview data show that principals engaged in fewer learning opportunities around equity, broadly defined, and that the quality of the learning varied.

To summarize, principals identified leading for instruction as the primary content of their professional learning, across a range of formal and informal learning opportunities. They reported fewer formal opportunities to learn about other content, including school climate, facilitating teacher collaboration, and strategic management, as well as leading for equity. Many principals focus on these content areas less often in informal learning as well, suggesting that principals might benefit from more formal learning opportunities about these topics.

Principals' Perceptions of the Usefulness of Professional Learning Opportunities

This section turns to the question of which professional learning principals found most useful. In both the survey and interviews, we asked principals about the types of professional learning that they found useful and whether they were generally satisfied with the learning opportunities they received. We found that principals tended to report that they were satisfied with their learning but also took responsibility for finding their own learning opportunities if their district failed to provide them. Principals identified learning about instruction as the most useful content. Principals also highlighted informal learning as particularly useful because it can address pressing needs and allows them to learn from colleagues. Lastly, principals stated that time constraints often hindered their professional learning, and they identified gaps in their learning related to special education, student discipline and behavior, and student mental health.

We note that those activities principals perceive to be most useful may not have the most impact on their practice, address the areas in which they need to improve, or support practices prioritized by their district. However, given that principals' perceptions shape their reality, it is informative to inquire into how they perceive learning opportunities and their usefulness.

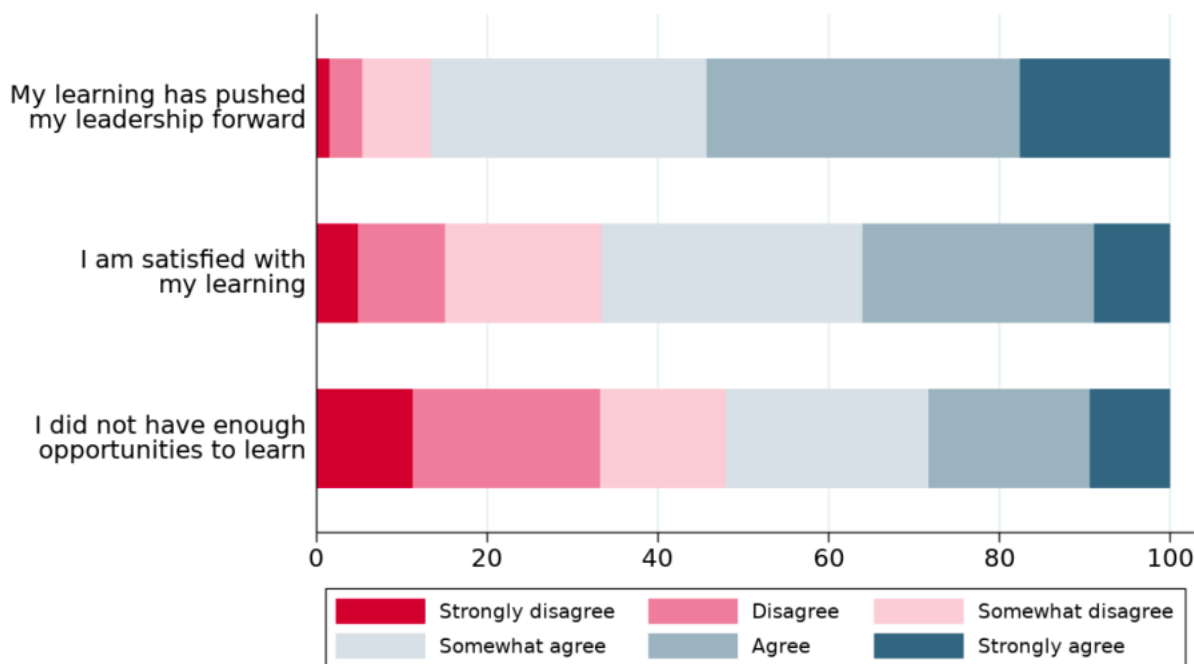
Most principals were satisfied with their learning opportunities, but many principals desired more.

In our national survey, we asked principals about their overall views of their professional learning opportunities. As shown in Figure 7, the large majority of principals felt their learning had pushed them forward (87%), and most (67%) felt satisfied overall. Still, about half (52%) felt that they did not receive enough learning opportunities. Principals' general satisfaction was reflected in most interviews. Consider this principal from Connecticut:

I feel pretty satisfied. I also think that it's on me. You know, if there are blind spots, it's not that I have to or that I should sit and wait for it to come to me. I can be more proactive in seeking out opportunities and I think I would get the support to go to these things.

Like this participant, many principals we interviewed took responsibility for finding their own additional opportunities when the learning they needed was not provided by their district. The survey data suggest that principals were most likely to feel satisfied and rate learning opportunities as effective when they found those learning opportunities to be relevant to practices at their school and aligned to their needs as a leader.

Figure 7: Principals' Overall Assessments of their Learning Opportunities



Source: Nationally representative sample of principals from RAND's American School Leader Panel. Principals were asked: "To what extent do you agree with each of the following statements about the professional learning you have engaged in over the last two years?"

Principals found learning opportunities focused on instructional engagement most useful.

On the survey, principals reported that learning about instructional engagement with teachers was both more frequent and more useful than other content areas. The lone exception was standalone trainings, which principals rated most useful for school climate (see in Appendix D).

In the interviews, too, principals said they found learning about instruction to be most useful to their practice. For example, one principal in Connecticut described "really amazing" instructional rounds:

Working with principals where we do what's called learning rounds, we meet twice a month in schools. I get out of my school. I go to one meeting and we're reading a book. We're learning our own professional learnings, growing and then the next visit we actually go into a classroom and watch teachers teach, looking at it with that mindset.

When we consider which different combinations of mode and content principals perceive to be useful, our survey results showed that principals generally reported learning opportunities as more useful when they happened more frequently. Taken together, these findings help us understand why principals found learning about instruction most useful—of all the content areas, principals had more professional learning on instructional engagement than other topics. Given the broader trend, it is not surprising that they found it more useful. Alternatively, they may value the topic of instructional engagement more than other topics, leading them to find learning in this area most useful.

Principals found informal opportunities especially useful because they responded to immediate needs.

When we compared how principals rated the usefulness of different professional learning modes on the survey, we found that principals elevated informal learning. Specifically, they rated informal conversations, learning by doing, and principal networks as the most useful modes of learning, as shown in Figure 8. Formal mentoring is also rated as very useful, possibly because formal mentorships can also be responsive to new needs that arise, as discussed below.

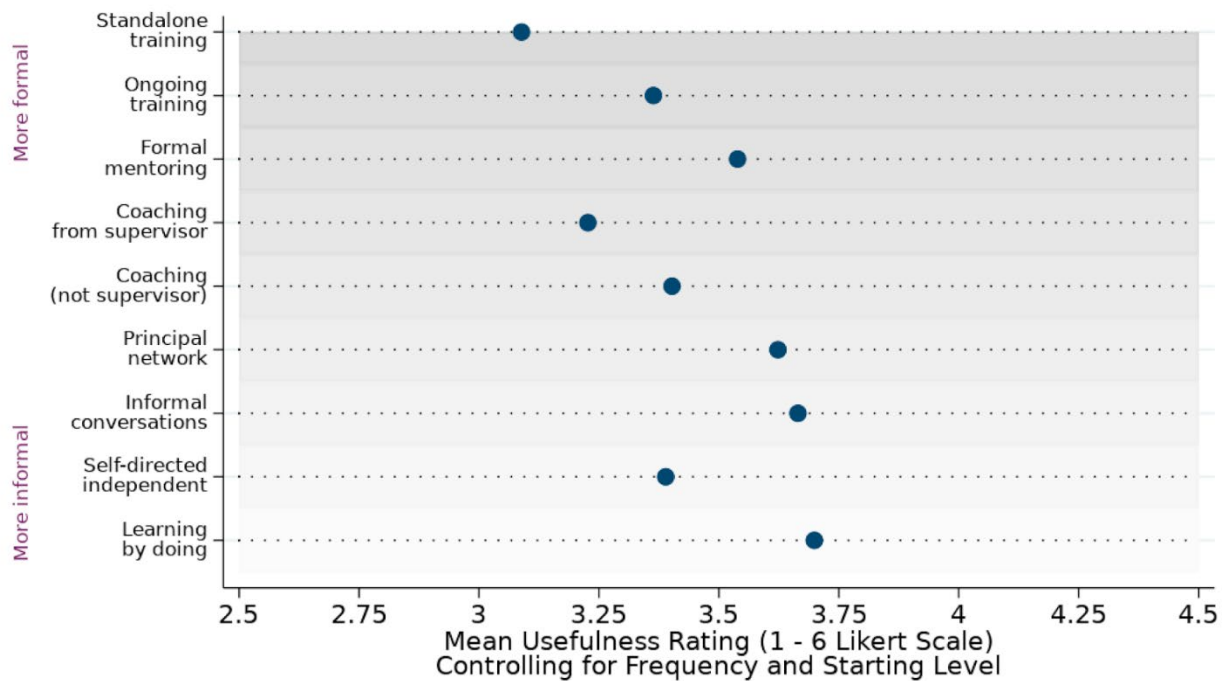
Notably, this pattern holds true even after we account for the fact that principals access informal learning opportunities more frequently, as we show in Figure 8. In a sense, principals are rating each instance of informal learning as more useful than each instance of the more formal learning opportunities. The exception is self-directed independent learning, which is rated similarly to ongoing training and coaching by one's supervisor, once frequency is taken into account.

Our interviews confirmed that principals valued learning that helped them solve problems they encountered in their everyday work. They often discussed useful learning as addressing a pressing need at their school. Principals valued both formal and informal learning as long as it responded to the demands that they faced on the job. "The best learning," said a Tennessee principal, "is always grounded in something that's really going on."

Principals often described looking for professional learning to help them figure out problems that emerged at their school. For example, one Washington principal described seeking out professional learning as a solution to the problems she noted around teachers' collaborative learning practices:

Honestly, I knew I had so much to learn that I went and sought out the opportunities myself. Prior to us becoming a PLC district, which is what we are now, I went to Solution Tree and I searched myself. How I could do a better job of creating collaborative structures that made a difference for kids here at [my school]? ...I sought out all of those [trainings] and I let the district know I was searching that out.

Figure 8: Usefulness of Professional Learning Content Coverage, by Mode



Source: Nationally representative sample of principals from RAND’s American School Leader Panel. Principals were asked: “How useful to improving your practice did you find each of the opportunities to learn about [content domain]” for each of five content domains. The response scale was *Not at all useful, Minimally useful, Somewhat useful, Very useful, Extremely useful*. We regressed the usefulness responses on the frequency and the principal’s reported prior understanding of the content domain for each learning mode. The figure shows the predicted usefulness of a mode of learning for a principal who identified themselves as having “slightly high” prior knowledge and skills for the content domain and who participated in that learning mode once per year.

In another example, a Connecticut high school principal described how conflicts over a transgender student participating on an athletic team required the principal to learn rapidly and on the job to protect the student and meet the student’s needs. Perhaps because the need for learning was so acute and immediate, this principal judged their learning in this case to be highly useful.

It is not surprising that the principals in our sample identified informal learning opportunities as especially useful. The principalship is complex and dynamic, presenting new challenges that span multiple leadership domains on a daily basis. Unlike other professions that have endorsed standard operating procedures, much of the work of principals is idiosyncratic and context-dependent. Thus, it might be expected that principals find self-directed, informal learning so useful. Faced with a dilemma, a principal can quickly access informal learning while they may have to wait a long stretch of time to participate in formal learning on the same topic. Informal learning thus addresses principals’ need for immediate support to address pressing problems. The utilitarian nature of informal learning by definition increases principals’ perception of its usefulness.

Principals found value in learning from colleagues, supervisors, and coaches.

We found that principals especially appreciated learning opportunities that allowed for social learning and collaboration. Principals highlighted learning with peers as particularly useful. Survey results indicated that principals found networks, conversations, and coaching as quite useful. In our interviews, principals explained that networks connect principals to each other and reduce the isolation they feel in their roles. For example, one Connecticut principal named a turnaround school principals network as instrumental to his learning. He recounted, “I had no vice principal and no leadership team. It was just me. It was very, very lonely.” The state’s program for turnaround school principals filled this void: “The turnaround principal program...was impactful because of the level of training that we got, the activities that we got to participate in, and the opportunity to engage with other leaders...” For principals in small districts, participating in district-level committees provided rich opportunities to learn from peers. As a Tennessee principal explained:

[M]y biggest amount of learning honestly comes from those small group discussions where I'm learning from principals that have principal'd longer than I have, and even less than I have...And so I am always listening. I just spend a lot more of that time listening, probably, than I do talking, because I'm trying to see, what pieces are they doing at their schools that are helping that I can bring back to [my school]?

Networks allowed principals to share knowledge and gain insights from trusted peers.

In addition to learning from other principals, participants reported that they also valued learning from and with experts and other leaders in different roles across their districts and their schools. In interviews across all three states, principals expressed positive views about coaching, working with consultants, and participating in learning walks. For example, one Connecticut principal stated that their learning was informed by fellow district administrators: “I learn a lot from them every time we get together. And our building leadership team has such a wide range of experiences with different backgrounds that I feel like I learn so much from them about education and about teaching and learning.” Similarly, a principal in Washington described learning as a result of participating in a small cohort of leaders implementing the district’s inclusion policy:

I think that there were five schools. We did a lot of work with them around use of time and scheduling, and I think that cohort was really helpful for me in thinking about the complexity... The director of special education really facilitated a thoughtful process. We observed other schools and collaborated with each other around it.

Principals reported that working with leaders who bring diverse perspectives into their collaboration supported their learning. In addition, principals felt that they benefited from alignment between professional learning and other supports (such

as coaching and their network), collaborating with colleagues with expertise (such as participating in PLCs with teachers), interacting with peers more generally, and having a superintendent who established a culture of learning.

Principals' perceptions of usefulness is a limited measure. It is likely influenced by the immediacy and acuteness of the problems confronting principals. A learning opportunity's usefulness may be unrelated to its alignment with district goals, state standards, or the extent to which it is research-based. Principals' perceptions of the problems that prompt useful professional learning may deviate from the issues that district leaders identify as most urgent or important. While many limitations hamper it as a construct, perceived usefulness provides us with some understanding of the extent to which principals considered a learning opportunity valuable and integrated it into their practice. Thus, these findings provide a starting point from which additional research can build and useful information for professional learning providers, like district and state leadership.

Principals identified challenges to their learning including areas in which they needed additional support and structures that limited their learning opportunities.

Principals described many powerful learning opportunities, but they also wanted more support in specific areas. For example, one principal in Tennessee described how they needed to learn more to support students experiencing mental health struggles:

For me, one of the most difficult pieces is the behaviors that we see, because there's just not enough preparation or support. There are many, many times that I'm like, I'm really tired of being hit and punched and kicked and spit at...some of the mental health issues and the things we see in children. And it's heartbreaking.

In particular, they named special education, student discipline/behavior, and student mental health.

Principals also identified several common obstacles to their professional learning. Consistent with prior research, many principals identified both a lack of time and other urgent demands as major obstacles. With expanding job responsibilities and heightened community obligations, principals had little time to engage fully in their own learning. For example, one Tennessee principal bemoaned the lack of time:

I wish I had more time to grow. I feel like right now, especially this time of the year, I am just busy all the time. I feel supported. I feel like there is professional learning available, and it has been provided for faculty and staff. And all of our meetings that we have are definitely beneficial. I wish I had more time to grow on my self-learning and just principal-for-fun books that I just don't have the time for that right now.

While principals report that training sessions are available to them, the lack of time often made those learning opportunities inaccessible.

Other principals recounted that pressing issues in their district displaced opportunities for professional learning. For instance, one Connecticut principal explained how the urgency of other demands crowded out learning:

I keep getting told that we're going to have time to [learn through collaboration with other principals]. We're going to have time to do that. But I've never had time to do that...the principals have been called into cabinet for certain things where we're all in the same room together. But it's never for collaboration. It's always for a necessity of something that needs to be done for the district. So we don't really have time to talk to one another. So we are on a text message, a text group. So the three of us do text with one another. But it's not really collaboration. It's like troubleshooting, like, 'hey, this happened. What did you do for this? What did you do for that?' You know, it's putting out fires more than proactively collaborating to make sure we're all on the same page.

For this principal and others, “putting out fires” took precedence over collaborating to deepen their own learning.

In sum, most principals reported that they were satisfied with their professional learning, but about half indicated that they did not receive enough learning opportunities. Leaders in our sample tended to find professional learning related to instructional engagement most useful. They also valued informal learning because it addressed their immediate needs. Our findings align with adult learning theory, which suggests that learning is most impactful when adults perceive it as relevant, applicable, and responsive to their needs. Both learning about instruction and informal learning happened frequently. Principals may have viewed learning about instructional engagement and informal learning as more relevant because they were more frequent, or they may have pursued more in these areas because they perceived them to be useful. In any case, the principals we interviewed expressed eagerness to learn and decried the barriers to their learning.

Conclusions and Implications

Principals engage in many modes of professional learning, both formal and informal. These modes range well beyond training sessions or workshops embedded in monthly districtwide principal meetings. Among formal opportunities, learning through networks was most frequent in our survey data, and came up often in interviews with principals—leaving us with the impression that the typical district across the three states we studied organized their principals into learning networks. Yet informal learning far outpaced these formal opportunities. Perhaps unsurprisingly, learning by doing on-the-job was the most frequently cited mode of learning among our survey respondents. Learning through informal conversations and self-directed learning (e.g., through books or podcasts) also came up more frequently than any of the formal opportunities.

These opportunities often are focused on principals' efforts to lead instruction in their schools, with other topics receiving less—and often less formal—attention. In some contexts, opportunities to learn about leading for equity lagged noticeably behind other opportunities. Given that our interviews took place primarily in the early months of 2025, a time when equity had become an especially politically contested topic, perhaps this finding is unsurprising. Principals found the more frequent opportunities to build expertise around leading instruction helpful but also reported wanting more support in other areas, including climate building, facilitation of teacher collaboration, and managing strategically.

In our interviews with district leaders, they described this shift in their focus for principal support as intentional, reflecting a correction to a past in which support provided to principals was primarily operational. Yet they also recognized the need to be more comprehensive in their approaches to learning content, and some even felt that the pendulum had swung too far toward instruction, necessitating attention to crafting learning opportunities reflecting a more holistic view of principals' needs.

Principals valued informal opportunities more highly than formal ones, perceiving those informal activities as allowing them to fill in knowledge gaps to meet immediate leadership needs. This observation aligns with the tenets of adult learning theory, which suggests that effective learning centers real problems of practice and is relevant to the principal's current work (Zepeda et al., 2014). Similarly, in line with the theory's emphasis on social interactions, we found that principals valued opportunities to learn by interacting with their peers, supervisors, and coaches.

Among our results, the finding that principals' learning tilts heavily toward informal opportunities prompted the keenest engagement in our interviews with district leaders. While some informal principal learning was a "fact of life" (principals would always need to be able to "pick up the phone and call or text a fellow principal" to help them with challenges), overreliance on informal opportunities was generally viewed negatively by district leaders. Several district leaders described this conclusion as "unfortunate" or "horrible." They wanted to be able to provide

principals with the supports they needed or worried that principals' reliance on informal learning meant that the information they accessed had the potential to be low-quality, not research-based, or not aligned to the district's vision. Several district leaders mentioned concerns about variability in the quality of these opportunities and a desire to reduce that variability through the "quality control" of district-provided opportunities. Others voiced concerns that principals might select topics that interested them but that were not pressing or necessary for that principal, given their skillset and their school context. In this way, informal learning might distract principals from engaging more deeply in matters that were more relevant to their leadership growth or germane to district priorities. Moreover, district leaders raised concerns regarding whether principals' informal learning sources exposed them to effective methods for addressing key problems. District leaders commented that our findings regarding the prevalence of informal learning, including learning by doing, motivated them to look more closely at how and what principals in their districts were learning through informal mechanisms and provide more support in differentiating higher- from lower-quality learning sources.

District leaders' observations—and the perspectives of principals we interviewed—speak more generally to a need for states and districts to orient towards building systems of principal professional learning that are coherent and address principals' most important needs.

Certainly, principals' access to meaningful learning opportunities varied substantially from location to location—another main finding of our analysis. Somewhat surprisingly, however, local contextual characteristics did not explain much of this variation in our survey data. Although we found that rural and middle school principals reported somewhat fewer opportunities to learn than their colleagues, these differences were not large. We did find that early-career principals had more opportunities than their more veteran colleagues—notably in the modes of mentoring and coaching—which is consistent with the idea that principals seek out, and districts and some states provide, more learning opportunities for novice principals. Also, our survey data showed that Black principals reported more frequent opportunities to learn than their White colleagues.

Implications for School Districts

Our results have numerous implications for school districts' approaches to principal support. In modulating these implications, we drew on our interviews with district leaders as a primary source of insight.

Each of the implications we discuss falls under a broad umbrella observation we make from our results: School districts benefit from building towards **coherent systems of principal professional learning** that ensure that principals regularly access relevant, high-quality learning opportunities that address their specific needs. These systems engage multiple modes of learning and content that spans different essential domains of principal practice.

Increase the relevance of district-sponsored learning opportunities

Districts should strive to make the learning opportunities that they sponsor or facilitate as relevant as possible to principals' week-to-week work. Often, principals seek out informal opportunities because what the district provides leaves them with knowledge or skill gaps. Several district leaders told us that learning about principals' high reliance on informal learning reinforced for them the need to invest more significantly in learning opportunities grounded in principals' problems of practice. This investment may take the form of integrating principals' problems of practice into district workshops by setting aside time for principals to work with colleagues on pressing problems or sponsoring mini-networks focused on topics generated by principals. It also highlights the role of coaching, which can be targeted to the individualized needs of principals. Regardless of the structure and logistics, increasing the relevance of formal learning opportunities would increase the likelihood that principals would find learning useful and integrate it into their daily practice.

District leaders also pointed us toward two specific strategies districts can employ: gathering regular input on needs from principals and differentiating learning opportunities. Several district leaders described how they formalize listening sessions with their principals to gather suggestions for potential learning opportunities. Others relied on surveys, forms distributed at principals' meetings, or regular, intentional conversations between principals and their supervisors. One district leader noted that this practice modeled what they expected principals to do for teachers in their buildings: using data and evidence to drive learning strategies.

Gathering principal input can assist districts with the second strategy: differentiation. Principals serving different student populations, with different skills, at different stages of their career, or facing different challenges in their schools often need different opportunities to learn. Meeting the spectrum of principal needs with "one-size-fits-all" learning approaches is unlikely to be successful. Individualized approaches, such as mentoring or coaching, can better target principals' areas for growth. Research on teacher mentoring suggests that practitioners often need more than one mentor to address their wide-ranging learning needs (Johnson & The Project on the Next Generation of Teachers, 2004). Principals are likely similar to teachers in this respect. Thus, organizing principals into small groups of peers in similar schools or with similar identified expertise gaps can help districts more efficiently employ learning resources while giving principals opportunities to collaborate.

Differentiating can also mean creating space for learning opportunities across domains of principal learning, even while recognizing the importance of maintaining a focus on instruction. Content related to equity, school climate, collaboration, and strategic management, among others, also are important. One district leader we interviewed said that feedback from their principals led them to develop nearly two dozen summer courses tackling a range of topics principals identified—and almost every course was filled to capacity. Echoing our interview

findings, this district's success in filling the summer courses suggests that principals are eager for learning opportunities that tie closely to their needs.

Support leaders to find quality learning opportunities that match their needs.

As several district leaders pointed out to us, districts cannot fill every principal learning need— perhaps especially in smaller districts with fewer central office staff. Yet even without the capacity to provide a complete menu of learning opportunities, several leaders underscored that they could still serve the role of helping principals recognize their learning needs and connecting them to opportunities to address those needs. Identifying knowledge and skill gaps through observation and facilitated reflection should be the responsibility of principal supervisors and principal coaches. These individuals can point principals towards quality learning resources. To this end, districts can compile lists or databases of reputable, effective learning resources that are aligned to district expectations from which supervisors or coaches can draw. District leaders' time and resources are limited, however, and, as discussed below, states or professional organizations could lead this effort by developing databases of high-quality learning opportunities on a variety of topics. Our interviews suggest that asking principals themselves about what resources have worked for them or not may be helpful in building a local resource compendium.

Lean into informal learning.

Although some district leaders were concerned about principals' reliance on informal learning, some also saw opportunity. Several district leaders noted opportunities to create space for informal collaborative learning through simple approaches like organizing seating at principals' meetings to facilitate productive connections and conversations and allowing time during the formal meetings for principals to connect and discuss what is top of mind. Some district leaders saw learning opportunities in carefully chosen podcasts that could deliver useful content "on the go," creating learning time during principals' commutes. Others suggested they could more explicitly encourage principals to organize into text groups or other informal networks that extend beyond formal networks that often exist within the district. This encouragement might even include some informal matchmaking at other district events. As one district leader noted, it can be difficult, especially in a large district, for principals to connect to peers in other parts of the city who might be helpful resources or collaborators just by happenstance. In rural districts, superintendents could play a key role in connecting principals with similar challenges across district boundaries. District leaders taking an affirmative role can lead to more productive informal learning.

Remove barriers to learning.

Districts also can aim to remove barriers to principal learning. One barrier both principals and district leaders acknowledged was time. Unless districts carve out and protect time for principals to engage in productive learning throughout the school

year, it is likely to be pushed to the side as principals attend to the many demands on their attention. With this goal in mind, several district leaders said they created month-to-month learning calendars for principals at the beginning of the school year with dedicated time for principals to engage.

In several smaller or more rural districts, resource scarcity was a barrier to principal learning. This scarcity was not financial so much as personnel-based; small central offices or small numbers of schools meant principals had access to fewer supports and fewer peers, coupled with more responsibilities. These district leaders suggested that engaging their neighboring districts could help them overcome these challenges, pooling resources to bring in external learning providers, creating new opportunities for principal networks, and “cross-pollinating” by exposing principals to practices employed elsewhere.

Other smaller districts noted that fewer leaders meant fewer opportunities to set up mentorships or coaching. Facilitating these kinds of opportunities may mean creating ways to cross district boundaries. Such approaches might include relying on regional offices or collaboratives, which many states organize, or making use of technology to set principals up with mentors or coaches via videoconferencing or other online platforms.

Attend to leadership for equity.

Districts can also bring greater emphasis to learning about leading for equity. Several district leaders noted their dismay that attention to this topic generally lagged others, calling out equity of opportunity among student groups as a main goal of schools and, by extension, school leaders. Yet they also recognized the political and rhetorical challenges of centering equity in many states and districts. District leaders highlighted the care they took in framing principal learning opportunities in such circumstances to avoid words that might erect barriers to good conversations. Several district leaders set aside “equity” in favor of “how we bring high-quality instruction to all students” or similar phrasing. Other district leaders discussed that creating specific, set-aside opportunities for equity learning was less productive than embedding equity principles, such as high expectations for every student or ensuring use of high-quality instructional materials in every classroom, in learning on other topics.

While embedding an “all students” approach across learning opportunities may be more politically viable in some places, for instructional and systems improvement to occur, principals may need also to learn explicitly about what it means to lead for equity (e.g., Galloway & Ishimaru, 2015; Gooden & Dantley, 2012). This yes/and approach, reflected in the Professional Standards for Educational Leaders (PSEL), may be necessary for principals to build the skills to ensure access to educational opportunities for students from marginalized backgrounds.

Implications for States

Our data collection also surfaced several implications for state-level leaders. States can play a key role in setting the conditions for districts to facilitate deep learning on the part of principals. State leaders can ensure that districts have the resources and knowledge base to support school leaders' learning. More generally, state leaders can provide leadership in building toward a more cohesive professional learning system for principals within their states that addresses principals' learning needs.

Provide resources for learning.

The importance of school principals for school outcomes underscores the need for opportunities for principals to learn to improve their practice. Over the past two decades, the field has come to acknowledge that schools work best when principals' learning is taken seriously and supported in systematic ways. To ensure that local districts can provide learning opportunities to principals, states should invest financial resources in principal learning at the same rate they invest in learning for teachers.

Collect and share high-quality learning resources.

States could also play an important role in identifying rich formal and informal learning opportunities for principals among those that currently exist. We were struck by the volume of informal learning reported by principals in our sample. District leaders raised questions regarding the quality of these learning experiences. States could help district leaders and principals by identifying high-quality formal and informal learning activities for principals.

Facilitate principals' access to networks for learning.

Given the perceived usefulness of networks to principals' learning, states could help to facilitate such networks across rural districts where principals often lack thought partners, especially at the same level at which they work. For example, Tennessee's Rural Principals' Network offers a three-year, cohort-based program for rural school leaders.² Through in-person and online gatherings, the Network offers participants opportunities to learn new content, develop relationships with colleagues, and deepen their understanding of rural school leadership.

Limit state-mandated demands on principals' time.

A general sentiment among interviewees was that demands on principals are increasing steadily without attendant increases in staff or resources to help meet those demands. Several district leaders identified state requirements as a main

² For more information see <https://www.tn.gov/education/news/2024/9/25/tdoe---belmont-university-name-57-school-leaders-to---2024-25-tennessee-rural-principals-network-.html>

source of these demands. States could inventory existing training requirements to identify which could be pared back, made less frequent, or removed entirely. Principals also called for their state legislatures and state education agencies to recognize how new laws and regulations enacted without aligned resources limited principal bandwidth and squeezed out attention to areas such as principal learning that they should have the space to prioritize.

Some district leaders specifically called out state legislation or rules that mandated lengthy state-provided training for principals. Such trainings, often delivered inefficiently or with little engagement of learners, crowd out learning time that could otherwise be spent on topics more closely linked to school improvement.

Implications for Principals

Principals are at the heart of our study, and our findings have several implications for them. Principals in our interview sample embraced the role of “lifelong learner” and “lead learner,” which is commendable. However, we caution principals and their supervisors against relying too heavily on this individualistic approach to leader learning. Principals have insufficient time and financial resources to fulfill their learning needs on their own. Principal learning needs to be part of a broader system that addresses the needs of the individual, school priorities, and district goals.

Assess learning needs and seek—and advocate for—learning opportunities that address those needs.

Across interviews, principals reported a thirst for learning. They sought learning opportunities that were formal, including those offered by their district or state, and informal, ranging from conversations with colleagues to ongoing text threads with peers to podcasts consumed during their commutes. Principals should hold themselves responsible for intentionally assessing and reassessing their needs on an ongoing basis and identifying learning resources that meet those needs. At the same time, they can advocate for their district, state, and professional organizations to increase their support for principals’ learning and to provide principals with high-quality learning opportunities. Principals are well-positioned to make arguments to district leaders and others about meeting their learning needs.

Protect time for learning.

Demands on principals’ time have increased substantially over the past two decades (Creagh et al., 2025). Yet learning requires space and time for reflection and understanding. Principals would be wise to dedicate time and space in their schedule for learning. Formal, district-sponsored learning is usually blocked into leaders’ schedules, but principals must protect time for informal learning. Many principals we interviewed used time creatively to create opportunities for them to learn. Whether they struck up conversations during breaks in formal professional learning sessions, listened to podcasts during their commute, or exchanged texts

with trusted colleagues in quiet moments during their school day, principals preserved time to learn new content and skills. Supervisors and other district leaders can be good allies in helping principals find ways to protect time for their own learning.

Future Directions for Education Researchers

This report brings initial attention to the prevalent content and modes of principal professional learning opportunities, the largely overlooked primacy of informal learning for principals, and variation in opportunities for principals to learn across schools and districts, among other areas. Our analysis, however, raises as many questions as it answers. We think our results suggest many productive avenues for future inquiry. These include:

- **Gaining a better understanding of school districts' approaches to principal professional learning.** The primary lens on professional learning in our study is the principal's perspective. Future research could more directly gather information from district leaders about how they understand the learning systems for principals in their districts and the match between district design or intent and the experiences of principals.
- **Exploring differences in learning opportunities and experiences across principals within the same district.** Although we documented differences in principals' experiences by characteristics of their schools, our data generally were not conducive to breaking down variation in professional learning within vs. between school districts. Interviews suggested that the experiences of principals in the same district indeed could be different. More systematically exploring this variation could bring attention to the extent to which districts are creating learning systems within their borders.
- **Better documenting the quality of principal learning resources.** As we report, principals generally give positive feedback about their opportunities to learn, but the quality of those opportunities and the information they transmit varies. A deeper, more specific look at what and how principals learn would be a useful next step in this area. It would be especially useful in the realm of the less formal, more self-identified resources that principals often seek out. Principals can access more sources of information than ever before, but to what extent are they accessing good information? And how can we make access to good learning resources more systematic?
- **Gaining greater purchase on the relationship between formal and informal learning.** Principals reported much greater participation in informal learning opportunities than formal ones. A more in-depth examination of the interplay between formal and informal learning could help us understand how districts can support principals' growth. Do informal opportunities supplement principals' formal learning activities or supplant them? Do the messages principals receive informally override or confirm the lessons they learn in formal, district-led learning sessions? Understanding this relationship may help explain the outcomes of principals' professional learning.

- **Investigating learning needs over the principal career.** The evidence we present suggests that learning opportunities differ between early-career and more veteran principals. As we have argued, such differentiation appears appropriate. Yet it would also be valuable to understand the evolution of principal learning needs over the life course of their careers and how opportunities are or can be targeted to meet those needs.
- **Linking approaches to principal professional learning to observed rather than reported outcomes.** Our analysis highlights some characteristics of professional learning that principals find more useful, such as informal opportunities they seek out, opportunities to learn about instruction, and opportunities to collaborate with others. A more complete accounting of what constitutes “effective” professional learning design, however, requires linking learning approaches or characteristics to other outcomes, such as measured changes in skills or practices.

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Appendix A. Description of Methods

Interviews with Current Principals

We conducted semi-structured interviews with 63 principals: 21 in Connecticut, 20 in Washington, and 22 in Tennessee. We sought balance within our sample in years of experience, locale type, gender, race, and grade level (see Table A1). We used purposive sampling to recruit, identifying participants based on our analysis of publicly available information and, in some cases, recommendations from individuals connected to principals across the states, including principal preparation program directors, central office leaders, and professional association leaders. We also leveraged existing contacts from our research-practice networks.

Table A1. Interview Sample Descriptive Statistics

	Connecticut	Tennessee	Washington	Total (%)
Gender				
Female	9	16	13	60%
Male	12	6	7	40%
Race/Ethnicity				
Black	4	5	3	19%
Hispanic	3	0	3	10%
White	13	17	12	67%
Multi-racial	1	0	2	5%
Years of Principal Experience				
0-5	10	13	6	46%
6-10	4	8	8	32%
11+	7	1	6	22%
School Level				
Elementary	9	13	12	54%
Middle	4	4	4	19%
High	7	2	3	19%
Other	1	3	1	8%
Locale				
Rural	4	9	4	27%
Suburban	7	3	5	24%
Urban	10	10	11	49%
N	21	22	20	63

To ensure that more robust inferences could be drawn about the experiences of principals of color, we interviewed at least 8 principals of color in each state, roughly doubling the proportion of leaders of color in the sample relative to the three states' principal workforces. This strategy helped maximize variation across factors that likely inform principals' professional learning choices and opportunities (Creswell, 2008).

Interviews lasted between 30 and 90 minutes, although most took roughly an hour, and were recorded and transcribed in Zoom. Interviews focused on participants' learning opportunities relative to the practice domains identified in Grissom, Egalite, and Lindsay (2021): interactions around instruction with teachers, building a strong school climate, helping teachers collaborate, strategic management, and leading for equity. For each practice domain, we asked each principal to describe: (a) how they learned to grow their practice, (b) what they've learned about the specific area, and (c) their assessment of whether and how useful the learning opportunities in this area have supported their leadership practice. We also asked about their overall satisfaction with their opportunities to learn, what areas they wanted more learning opportunities in, and the most impactful learning experience they have had as a principal. The full interview protocol is included in Appendix B.

To analyze the data, each state team uploaded transcripts into qualitative analysis software using an identical format. We coded the data using codes including mode, content, usefulness, desired learning, and definition of equity, among others. Each state team had multiple coders and used iterative processes to calibrate. Further, we calibrated across state teams to refine our codebook and ensure consistency in our coding. We also added new codes for themes that emerged from the data during analysis.

State teams synthesized data related to our research questions, namely modes of professional learning, content addressed in learning opportunities, and combinations of professional learning mode and content leaders perceive as most useful to their practice, to produce summary memos. We used these memos to compare across contexts, noting commonalities within and across states and identifying discrepancies in the data.

National Survey

We contracted with RAND to ask roughly 15 minutes of questions as a module for their nationally representative American School Leader Panel (ASLP). We developed the survey module by reviewing existing surveys of principal professional learning such as the ones described in Darling-Hammond et al. (2022) and drawing on our ongoing review of the principal professional learning literature, results of our early principal interviews, and RAND's survey guidance. We explored multiple approaches to the survey. After settling on an approach and drafting questions and response scales, we circulated the module draft to multiple principals for feedback. Once we incorporated feedback, we conducted cognitive interviews on the near-final draft

with three principals, then made final adjustments given the cognitive interview results.

Survey questions focused on the intersection of learning mode and content in professional learning. For these questions, we delineated nine different modes of principal learning from our principal interviews and literature review: stand-alone workshops, ongoing workshops, principal networks, coaching from a supervisor, coaching from a non-supervisor, formal mentoring, informal conversations, self-directed independent learning, and learning by doing. Then, for each of the four domains of practice plus leading for equity from Grissom et al. (2021), we asked about the frequency of participation of different modes of learning in that area, then the usefulness of each mode for that area.

Beyond these questions about modes of professional learning within each domain, we also included two additional item sets eliciting more general views of their professional learning opportunities. One set drew on Zepeda et al. (2014) to ask about the degree to which principals' learning opportunities reflected the principles of adult learning theory (e.g., differentiation with respect to need, cohort-based). A second set captured general satisfaction with learning opportunities. A concluding free-response item asked principals for examples of "learning by doing" on-the-job. The full survey text is included in Appendix C.

RAND survey collection began on January 27, 2025, and concluded on February 17, 2025. After sending the survey to 3,121 principals, RAND obtained a total of 998 complete responses and 100 partially complete responses for a completion rate of 34%. Appendix D shows respondent characteristics. Survey responses are weighted to ensure national representativeness. In our analysis, we summarized survey responses, overall and conditional by school and principal characteristics. We also estimated regression models to test for differences in survey responses accounting for multiple school and/or principal characteristics at once.

Our analyses frequently involved taking the mean of different frequency measures due to the large number of combinations of mode and content. To describe differences by learning mode, we averaged the frequency of each mode across all content areas. To describe differences by content area, we averaged the frequency of each content area across all (or a meaningful subset of) modes. Our original frequency scale for the survey had six points: never, once per year, 2–4 times per year, about once a month, 2–3 times per month, and once a week or more. Because this scale does not have equal intervals between points, taking the mean is an ineffective summary, and quantitative differences in means were not especially meaningful. Therefore, for analyses, we rescaled the frequency scale to be instances per year, such that the above six categories became: 0 times per year, 1 time per year, 3 times per year, 10 times per year (about once a month with 2 summer months excepted), 25 times per year (2.5 times per month for 10 months), and 42 times per year (once per week with 10 summer and holiday weeks excepted).

Interviews with District Leaders

Following analyses of the principal interview and survey data, we conducted structured interviews with district leaders in Connecticut (N = 8), Tennessee (N = 5), and Washington (N = 7) to gain their insights into our main results. District participants represented a range of urban, suburban, and rural settings in the three states. All came from districts in which we also had interviewed principals. Interviewees were primarily superintendents or district leaders whose work included support for principals.

Interviews lasted 20–30 minutes. In these interviews, we shared the main conclusions from the analyses of the principal data and asked participants to reflect on those conclusions. Specifically, we asked whether those conclusions resonated for their districts, why or why not, and what implications they thought the conclusions may have for district policies and practices.

Appendix B. Principal Interview Protocol

Thank you for your time.

Just to review, I'll give you a summary of our research. We're interviewing principals in Washington, Tennessee, and Connecticut to learn more about the learning opportunities they've had and which experiences have been most useful for them. In addition to learning from the interviews, we'll use what we learn to develop a survey that will go out nationally.

In this interview, we'll ask you a few questions about your school, then we'll ask you about your pre-service preparation for being a principal and then the learning you've had a chance to do as a principal.

Just as a reminder, our study is not evaluative. We're not setting out to judge you, your prep program, your district, your school or your students. We're interested in what opportunities you've had and how those have helped you grow as a leader.

We want to recognize that as we interview you, our races, genders, and other parts of our identities might shape our discussion. We know that those dynamics can influence how you choose to answer our questions and we just want to be aware.

We also want to remind you that what you tell us is confidential. We'll share what we're learning with our research team, but we won't share your particular thoughts or responses with anyone else. We'll also check with you before we publish anything to make sure it aligns with your understanding and you feel like you are appropriately represented. We won't use your name or the name of your school or district.

Participating in this study is voluntary. At any point during the interview, if you want me to turn off the recording, just tell me to do so.

Do you have any questions about the study before we begin?

We have 11 questions and about [30/40] minutes. I might move us on at a given moment so we're able to get to all of the questions.

Section 1. Background (refer to information sheet)

We'd love to learn a bit more about your school and the community you serve.

1. Tell me a bit about your school.
2. Is there a leadership team at your school? Can you describe it?

Section 2. Pre-Service Preparation

This section is about the learning you did before becoming a principal.

3. How prepared to be a principal did you feel coming into the principal role?
4. Thinking about your preparation program, did you feel that the learning experiences it provided set you up for success in your first year as a principal? Why or why not?
5. What other significant learning experiences did you have outside of a formal preparation program coming into the principal role?
 - a. Probe: other leadership roles, “bridge” programs

Section 3. Professional Learning as a Principal

We are interested in how principals learn on-the-job, meaning how they continue learning to be an effective principal **after starting the role**. We think about learning broadly, including technical skills (like knowing how to use the district evaluation mode), learning about yourself as a leader (like how your background and experience impacts how you lead others), and content (like understanding the math content standards). We also know that learning happens in a range of ways, from formal professional development to informal interactions with colleagues.

6. I’m going to ask you about on-the-job learning in some specific areas, but before I do that, can you describe an example of your recent learning as a principal?
 - a. Walk me through how you learned it. Were there any informal ways you’ve learned about _____? (Be sure to capture what they learned and how)
7. Now I am going to walk through a few broad areas of the principal’s job. For each area, I’d like you to tell me: (a) **how you’ve learned to grow your practice**, (b) **what you’ve learned about that specific area**, and (c) **your assessment of whether and how useful the learning opportunities in this area have supported your leadership practice**.

When you are describing how you learn to grow your practice, be as specific as possible. Tell me about specific ideas or skills you think you’ve learned or learned better and also how that learning has happened—either through formal opportunities like district PD, or informal ones like personal and professional relationships, books you’ve read, podcasts you follow, etc.

- a. Interactions around instruction with teachers (e.g., observation, feedback, coaching)
 - i. specific content of the learning - What ideas, skills, practices did you learn?
 - ii. mode of the learning - How did the learning happen?
 - iii. assessment of helpfulness, usefulness of that learning- How useful or helpful was it?

- b. Building a strong school climate
 - i. specific content
 - ii. mode
 - iii. assessment of helpfulness, usefulness
- c. Helping teachers in your school collaborate
 - i. specific content
 - ii. mode
 - iii. assessment of helpfulness, usefulness
- d. Strategic management
 - i. specific content
 - ii. mode
 - iii. assessment of helpfulness, usefulness
- e. Pursuing equity
 - i. Probe for how the interviewee defines “equity”
 - ii. specific content
 - iii. mode
 - iv. assessment of helpfulness, usefulness

Note: if the interviewee responds to these questions about things they've learned in the past (not while they have been a principal), ask if they have learned anything in particular during their time as a principal.

- 8. Overall, how satisfied are you with your opportunities to learn on-the-job?
- 9. What areas are you less satisfied with? What do you need more of?
- 10. What is the most impactful learning experience you've had as a principal?
- 11. Is there anything about your learning as a principal that you haven't told me that would be important for me (or the field) to know?

Appendix C. National Principal Survey Protocol

About This Module

The following module of questions is being asked as part of a study of principal professional learning led by researchers at Vanderbilt University. Questions about the study can be directed to Dr. Jason Grissom at jason.grissom@vanderbilt.edu or (615) 322-6441.

The next series of questions are about your opportunities to learn and grow on the job. We mean learning broadly, including technical skills (like knowing how to use the district evaluation mode), learning about yourself as a leader (like how your background and experience impacts how you lead others), and content (like understanding the math content standards).

For all questions, we are going to ask you to think back over the last two years, even if you weren't a principal two years ago.

To what extent do you agree that the professional learning opportunities you have had over the last two years have had each of the following characteristics? *[Row order randomized]*

My professional learning opportunities have been....

	Strongly disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree
01 Tightly connected to my day-to-day work	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
02 Relevant to practices I implement at my school	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
03 Well aligned to my needs as a leader	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6

04	Differentiated to develop my specific leadership capacities	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
05	Driven by my own choices about my learning	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
06	Chosen by others	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
07	Coherent across different modes of learning	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
08	Strategically chosen	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
09	Prioritized in my schedule	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
10	Continuous throughout the year	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
11	A way to connect with other leaders	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
12	Conducted with a consistent group of other leaders	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6

We will ask you to reflect on five general areas of potential learning as well as your overall thoughts about your learning opportunities. Those five areas are: 1) engaging with teachers around their instructional practice, 2) building a strong school climate,

3) facilitating teacher collaboration and professional learning communities, 4) managing resources strategically, and 5) equity.

The first area is engaging with teachers around their instructional practice. This area involves supporting activities such as analyzing classroom data from observations or other sources, supporting instructional planning and curriculum development, coaching, and planning teacher learning opportunities.

Two years ago, your knowledge and skills for engaging with teachers around their instructional practice were...

- 1 Very low—this was an area that needed a lot of growth
- 2 Low
- 3 Slightly low
- 4 Slightly high
- 5 High
- 6 Very high—this was an area in which you excelled

Over the last two years, how frequently did you participate in each of the following potential learning opportunities on engaging with teachers around their instructional practice?

	Never	Once per year	2 - 4 times per year	About once a month	2 - 3 times per month	Once a week or more
Stand-alone workshops, conferences, or trainings (that is, "one-off" rather than ongoing, cumulative learning opportunities)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6

<p>Ongoing workshops or trainings that are part of a series and build cumulatively on one another</p>	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6
<p>Participating in a principal network or community of practice organized around common learning goals (e.g., a group of principals organized by the district, an outside organization, or online)</p>	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6
<p>Receiving coaching from a supervisor (e.g., engaging in observation and feedback as part of a supervisor’s school visits or district evaluation processes)</p>	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6
<p>Receiving coaching from someone other than a supervisor (e.g., engaging in observation and feedback with a district or external expert, school rounds with district or external support personnel)</p>	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6

Receiving formal mentoring from a more experienced leader (not a supervisor)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
Informal conversations (e.g., in person, virtual, via text) with peers, informal mentors, or supervisors with a learning component	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
Self-directed independent learning (e.g., via books, podcasts, YouTube)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
Learning by doing on-the-job (that is, trying a new practice or tool and assessing its efficacy)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6

How useful to improving your practice did you find each of the opportunities to learn about engaging with teachers around their instructional practice? *[Skip rows indicated in the previous question as “never”]*

	Not at all useful	Minimally useful	Somewhat useful	Useful	Very useful	Extremely useful
Stand-alone workshops, conferences, or trainings (that is, “one-off” rather than ongoing, cumulative learning opportunities)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
Ongoing workshops or trainings that are part of a series and build cumulatively on one another	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
Participating in a principal network or community of practice organized around common learning goals (e.g., a group of principals organized by the district, an outside organization, or online)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6

<p>Receiving coaching from a supervisor (e.g., engaging in observation and feedback as part of a supervisor’s school visits or district evaluation processes)</p>	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6
<p>Receiving coaching from someone other than a supervisor (e.g., engaging in observation and feedback with a district or external expert, school rounds with district or external support personnel)</p>	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6
<p>Receiving formal mentoring from a more experienced leader (not a supervisor)</p>	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6

Informal conversations (e.g., in person, virtual, via text) with peers, informal mentors, or supervisors with a learning component	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
Self-directed independent learning (e.g., via books, podcasts, YouTube)	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
Learning by doing on-the-job (that is, trying a new practice or tool and assessing its efficacy)	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

The second area we are interested in is **building a strong school climate**. This area involves creating a climate in your school that supports teaching and learning through activities such as promoting safety, recognizing good performance, building trust, and engaging families and the broader community.

Two years ago, your knowledge and skills for building a strong school climate were...

- 1 Very low—this was an area that needed a lot of growth
- 2 Low
- 3 Slightly low
- 4 Slightly high
- 5 High

Over the last two years, how frequently did you participate in each of the following potential learning opportunities on building a strong school climate?

	Never	Once per year	2 - 4 times per year	About once a month	2 - 3 times per month	Once a week or more
Stand-alone workshops, conferences, or trainings (that is, “one-off” rather than ongoing, cumulative learning opportunities)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
Ongoing workshops or trainings that are part of a series and build cumulatively on one another	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
Participating in a principal network or community of practice organized around common learning goals (e.g., a group of principals organized by the district, an outside organization, or online)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6

<p>Receiving coaching from a supervisor (e.g., engaging in observation and feedback as part of a supervisor’s school visits or district evaluation processes)</p>	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6
<p>Receiving coaching from someone other than a supervisor (e.g., engaging in observation and feedback with a district or external expert, school rounds with district or external support personnel)</p>	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6
<p>Receiving formal mentoring from a more experienced leader (not a supervisor)</p>	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6
<p>Informal conversations (e.g., in person, virtual, via text) with peers, informal mentors, or supervisors with a learning component</p>	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6
<p>Self-directed independent learning (e.g., via books, podcasts, YouTube)</p>	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6

Learning by doing on-the-job (that is, trying a new practice or tool and assessing its efficacy)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
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How useful to improving your practice did you find each of the opportunities to learn about building a strong school climate? *[Skip rows indicated in the previous question as “never”]*

	Not at all useful	Minimally useful	Somewhat useful	Useful	Very useful	Extremely useful
Stand-alone workshops, conferences, or trainings (that is, “one-off” rather than ongoing, cumulative learning opportunities)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
Ongoing workshops or trainings that are part of a series and build cumulatively on one another	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6

<p>Participating in a principal network or community of practice organized around common learning goals (e.g., a group of principals organized by the district, an outside organization, or online)</p>	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6
<p>Receiving coaching from a supervisor (e.g., engaging in observation and feedback as part of a supervisor’s school visits or district evaluation processes)</p>	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6
<p>Receiving coaching from someone other than a supervisor (e.g., engaging in observation and feedback with a district or external expert, school rounds with district or external</p>	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6

support personnel)						
Receiving formal mentoring from a more experienced leader (not a supervisor)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
Informal conversations (e.g., in person, virtual, via text) with peers, informal mentors, or supervisors with a learning component	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
Self-directed independent learning (e.g., via books, podcasts, YouTube)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6

Learning by doing on-the-job (that is, trying a new practice or tool and assessing its efficacy)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
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The third area we are interested in is **facilitating teacher collaboration and professional learning communities**, which involves helping teachers work together authentically and learn from one another.

Two years ago, your knowledge and skills for facilitating teacher collaboration were...

- 1 Very low—this was an area that needed a lot of growth
- 2 Low
- 3 Slightly low
- 4 Slightly high
- 5 High
- 6 Very high—this was an area in which you excelled

Over the last two years, how frequently did you participate in each of the following potential learning opportunities on facilitating teacher collaboration?

	Never	Once per year	2 - 4 times per year	About once a month	2 - 3 times per month	Once a week or more
Stand-alone workshops, conferences, or trainings (that is, “one-off” rather than ongoing, cumulative learning opportunities)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6

<p>Ongoing workshops or trainings that are part of a series and build cumulatively on one another</p>	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6
<p>Participating in a principal network or community of practice organized around common learning goals (e.g., a group of principals organized by the district, an outside organization, or online)</p>	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6
<p>Receiving coaching from a supervisor (e.g., engaging in observation and feedback as part of a supervisor’s school visits or district evaluation processes)</p>	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6
<p>Receiving coaching from someone other than a supervisor (e.g., engaging in observation and feedback with a district or external expert, school rounds with district or external support personnel)</p>	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6

Receiving formal mentoring from a more experienced leader (not a supervisor)	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6
Informal conversations (e.g., in person, virtual, via text) with peers, informal mentors, or supervisors with a learning component	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6
Self-directed independent learning (e.g., via books, podcasts, YouTube)	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6
Learning by doing on-the-job (that is, trying a new practice or tool and assessing its efficacy)	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6

How useful to improving your practice did you find each of the opportunities to learn about facilitating teacher collaboration? *[Skip rows indicated in the previous question as “never”]*

	Not at all useful	Minimally useful	Somewhat useful	Useful	Very useful	Extremely useful
Stand-alone workshops, conferences, or trainings (that is, “one-off” rather than ongoing, cumulative learning opportunities)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
Ongoing workshops or trainings that are part of a series and build cumulatively on one another	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
Participating in a principal network or community of practice organized around common learning goals (e.g., a group of principals organized by the district, an outside organization, or online)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6

<p>Receiving coaching from a supervisor (e.g., engaging in observation and feedback as part of a supervisor’s school visits or district evaluation processes)</p>	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6
<p>Receiving coaching from someone other than a supervisor (e.g., engaging in observation and feedback with a district or external expert, school rounds with district or external support personnel)</p>	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6
<p>Receiving formal mentoring from a more experienced leader (not a supervisor)</p>	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6

Informal conversations (e.g., in person, virtual, via text) with peers, informal mentors, or supervisors with a learning component	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6
Self-directed independent learning (e.g., via books, podcasts, YouTube)	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6
Learning by doing on-the-job (that is, trying a new practice or tool and assessing its efficacy)	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6

The fourth area we are interested in is **managing resources strategically**. This area involves allocating resources such as the school budget, time, and personnel to better support the school’s teaching and learning goals.

Two years ago, your knowledge and skills for managing resources strategically were...

- 1 Very low—this was an area that needed a lot of growth
- 2 Low
- 3 Slightly low
- 4 Slightly high

5 High

6 Very high–this was an area in which you excelled

Over the last two years, how frequently did you participate in each of the following potential learning opportunities on managing resources strategically?

	Never	Once per year	2 - 4 times per year	About once a month	2 - 3 times per month	Once a week or more
Stand-alone workshops, conferences, or trainings (that is, “one-off” rather than ongoing, cumulative learning opportunities)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
Ongoing workshops or trainings that are part of a series and build cumulatively on one another	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
Participating in a principal network or community of practice organized around common learning goals (e.g., a group of principals organized by the district, an outside organization, or online)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6

<p>Receiving coaching from a supervisor (e.g., engaging in observation and feedback as part of a supervisor’s school visits or district evaluation processes)</p>	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6
<p>Receiving coaching from someone other than a supervisor (e.g., engaging in observation and feedback with a district or external expert, school rounds with district or external support personnel)</p>	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6
<p>Receiving formal mentoring from a more experienced leader (not a supervisor)</p>	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6
<p>Informal conversations (e.g., in person, virtual, via text) with peers, informal mentors, or supervisors with a learning component</p>	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6
<p>Self-directed independent learning (e.g., via books, podcasts, YouTube)</p>	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6

Learning by doing on-the-job (that is, trying a new practice or tool and assessing its efficacy)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
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How useful to improving your practice did you find each of the opportunities to learn about managing resources strategically?

	Not at all useful	Minimally useful	Somewhat useful	Useful	Very useful	Extremely useful
Stand-alone workshops, conferences, or trainings (that is, "one-off" rather than ongoing, cumulative learning opportunities)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
Ongoing workshops or trainings that are part of a series and build cumulatively on one another	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6

<p>Participating in a principal network or community of practice organized around common learning goals (e.g., a group of principals organized by the district, an outside organization, or online)</p>	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6
<p>Receiving coaching from a supervisor (e.g., engaging in observation and feedback as part of a supervisor’s school visits or district evaluation processes)</p>	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6
<p>Receiving coaching from someone other than a supervisor (e.g., engaging in observation and feedback with a district or external expert, school rounds with district or external</p>	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6

support personnel)						
Receiving formal mentoring from a more experienced leader (not a supervisor)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
Informal conversations (e.g., in person, virtual, via text) with peers, informal mentors, or supervisors with a learning component	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
Self-directed independent learning (e.g., via books, podcasts, YouTube)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6

Learning by doing on-the-job (that is, trying a new practice or tool and assessing its efficacy)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
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The final area we are interested in is **leading for equity**. This area involves leading in ways that recognize how school processes and practices can disadvantage some students and communities. Leading for equity includes designing systems and practices that ensure that all students receive high quality learning opportunities that lead to equitable outcomes.

Two years ago, your knowledge and skills for leading for equity were...

- 1 Very low—this was an area that needed a lot of growth
- 2 Low
- 3 Slightly low
- 4 Slightly high
- 5 High
- 6 Very high—this was an area in which you excelled

Over the last two years, how frequently did you participate in each of the following potential learning opportunities on leading for equity?

	Never	Once per year	2 - 4 times per year	About once a month	2 - 3 times per month	Once a week or more
Stand-alone workshops, conferences, or trainings (that is, “one-off” rather than ongoing, cumulative)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6

learning opportunities)						
Ongoing workshops or trainings that are part of a series and build cumulatively on one another	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
Participating in a principal network or community of practice organized around common learning goals (e.g., a group of principals organized by the district, an outside organization, or online)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
Receiving coaching from a supervisor (e.g., engaging in observation and feedback as part of a supervisor's school visits or district evaluation processes)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6

Receiving coaching from someone other than a supervisor (e.g., engaging in observation and feedback with a district or external expert, school rounds with district or external support personnel)	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6
Receiving formal mentoring from a more experienced leader (not a supervisor)	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6
Informal conversations (e.g., in person, virtual, via text) with peers, informal mentors, or supervisors with a learning component	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6
Self-directed independent learning (e.g., via books, podcasts, YouTube)	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6
Learning by doing on-the-job (that is, trying a new practice or tool and assessing its efficacy)	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6

How useful to improving your practice did you find each of the opportunities to learn about leading for equity? *[Skip rows indicated in the previous question as “never”]*

	Not at all useful	Minimally useful	Somewhat useful	Useful	Very useful	Extremely useful
Stand-alone workshops, conferences, or trainings (that is, “one-off” rather than ongoing, cumulative learning opportunities)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
Ongoing workshops or trainings that are part of a series and build cumulatively on one another	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
Participating in a principal network or community of practice organized around common learning goals (e.g., a group of principals organized by the district, an outside organization, or online)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6

<p>Receiving coaching from a supervisor (e.g., engaging in observation and feedback as part of a supervisor’s school visits or district evaluation processes)</p>	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6
<p>Receiving coaching from someone other than a supervisor (e.g., engaging in observation and feedback with a district or external expert, school rounds with district or external support personnel)</p>	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6
<p>Receiving formal mentoring from a more experienced leader (not a supervisor)</p>	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6

Informal conversations (e.g., in person, virtual, via text) with peers, informal mentors, or supervisors with a learning component	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
Self-directed independent learning (e.g., via books, podcasts, YouTube)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
Learning by doing on-the-job (that is, trying a new practice or tool and assessing its efficacy)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6

To what extent do you agree with each of the following statements about the professional learning you have engaged in over the last two years?

	Strongly disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree
01 I am satisfied with the professional learning that I have had	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6

02 My professional learning has pushed my leadership practice forward	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
03 I <u>did not</u> have enough opportunities to engage in meaningful professional learning	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6

Earlier we asked you about learning by doing on-the-job, which may occur in different ways. When you think about this kind of learning in your own work, what are the main examples that come to mind?

Appendix D. Survey Respondent Characteristics

	Unweighted	Weighted
Principal Characteristics		
% Black	10.1	10.8
% Hispanic	5.4	5.8
% White	78.0	76.7
% Other Race/Ethnicity	6.4	6.8
Avg. Years of Experience	11.8	11.7
School Characteristics		
% Rural	31.2	31.1
% Town	10.1	9.9
% Suburban	30.7	31.1
% Urban	28.1	27.9
Avg. % FRPL Students	55.6	56.3
Avg. % Students of Color	48.9	50.4
% Elementary School	60.1	59.1
% Middle School	17.4	16.8
% High School	22.5	24.0
Avg. School Enrollment	561	566
Avg. District Enrollment	33,269	33,292

Appendix E. Regression Results

Figure E1. Predicting satisfaction with adult learning characteristics

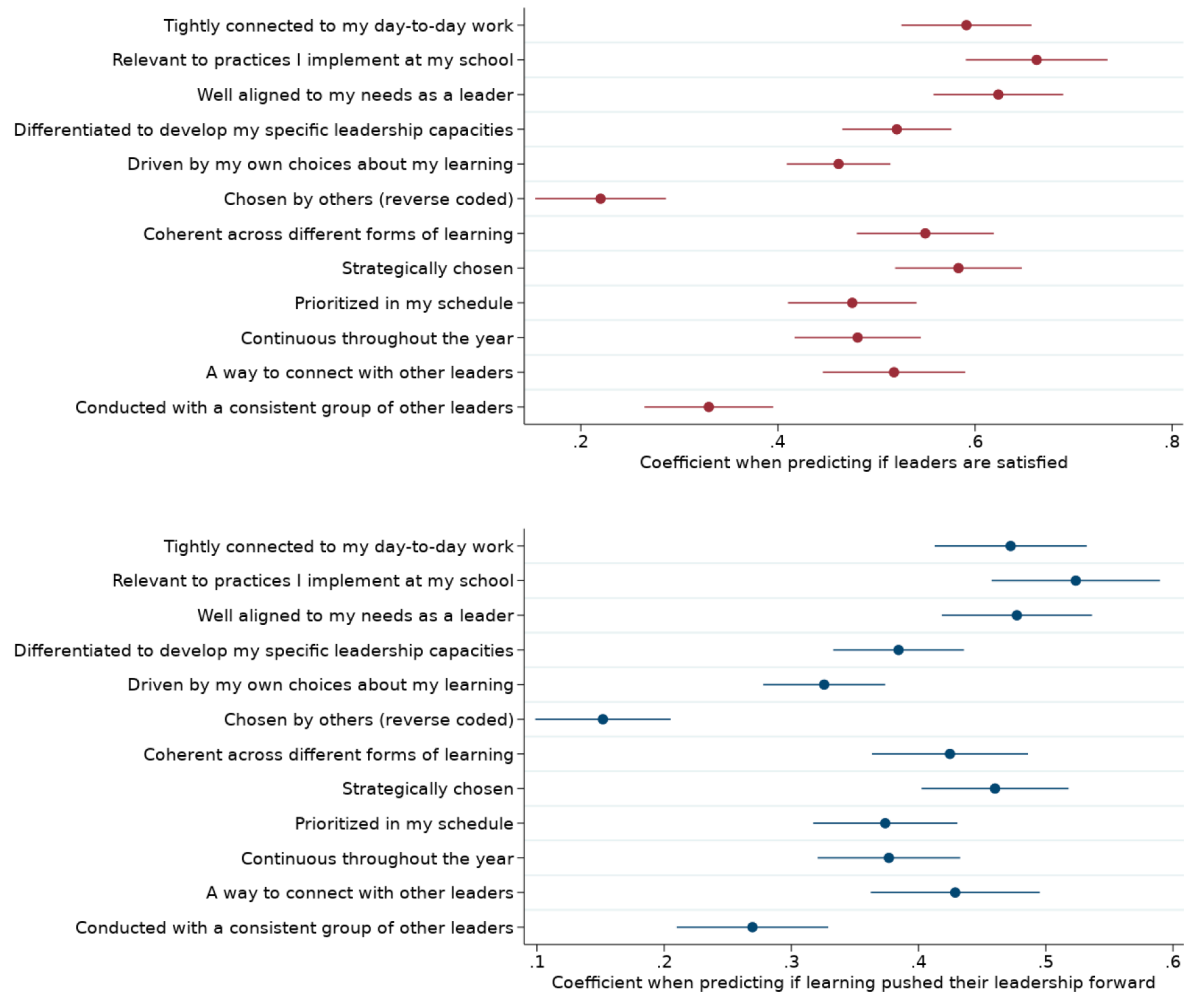


Table E2. Predicting usefulness of different content within each mode, controlling for starting level and frequency. The contents are all relative to teacher collaboration.

	Standalone training	Ongoing training	Principal network	Coaching from supervisor	Coaching (not supervisor)	Formal mentoring	Informal conversations	Self-directed independent	Learning by doing
Instructional Engagement	0.09 (0.055)	0.320*** (0.056)	0.330*** (0.056)	0.274*** (0.063)	0.298*** (0.076)	0.349*** (0.095)	0.195*** (0.045)	0.108* (0.043)	0.202*** (0.040)
Climate	0.124* (0.057)	0.111 (0.061)	0.163** (0.058)	0.115 (0.066)	0.113 (0.076)	0.096 (0.095)	0.094* (0.044)	0.096* (0.043)	0.105** (0.039)
Strategic Management	-0.071 (0.065)	-0.295*** (0.072)	-0.150* (0.062)	0.127 (0.067)	-0.064 (0.080)	-0.125 (0.098)	0.006 (0.047)	-0.093 (0.050)	0.013 (0.042)
Learning for Equity	-0.071 (0.059)	-0.058 (0.064)	-0.068 (0.059)	0.063 (0.069)	-0.05 (0.081)	-0.143 (0.096)	-0.039 (0.047)	-0.065 (0.046)	-0.099* (0.042)
R2	0.114	0.143	0.14	0.166	0.144	0.175	0.294	0.362	0.409
N	3,555	3,192	3,835	2,973	2,390	1,462	4,434	4,117	4,576

Note that in all usefulness regressions, the Ns vary across regressions because principals were only asked about usefulness if they indicated receiving any training in that area—so rarer modes of learning (such as formal mentoring) have less usefulness data to draw from.

Table E3. Predicting usefulness of informal learning vs. formal learning for each content area, controlling for starting level and frequency

	Instructional Engagement	Climate	Teacher Collaboration	Strategic Management	Leading for Equity
Informal	0.168*** (0.030)	0.106*** (0.030)	0.093** (0.029)	0.185*** (0.032)	0.126*** (0.031)
R2	0.224	0.291	0.303	0.302	0.269
N	7,165	6,575	6,357	5,019	5,553